

JOURNAL
OF THE
ARNOLD ARBORETUM
HARVARD UNIVERSITY

EDITORIAL BOARD

A. C. SMITH, <i>Editor</i>	P. C. MANGELSDORF
I. W. BAILEY	E. D. MERRILL
J. H. FAULL	H. M. RAUP
I. M. JOHNSTON	A. REHDER
C. E. KOBUSKI	K. SAX

VOLUME XXIII



JAMAICA PLAIN, MASS.
1942

Reprinted with the permission of the
Arnold Arboretum of Harvard University
KRAUS REPRINT CORPORATION
New York
1968

54681

DEC 12 1968

Greenhouse

Am

ARB

1968

DATES OF ISSUE

No. 1 (pp. 1-132, 6 pl.) issued January 15, 1942.

No. 2 (pp. 133-266, 2 pl.) issued April 15, 1942.

No. 3 (pp. 267-382, 5 pl.) issued July 15, 1942.

No. 4 (pp. 383-539, 4 pl.) issued October 15, 1942.

Printed in U.S.A.

TABLE OF CONTENTS

ADDITIONS TO THE CATALOGUE OF THE VASCULAR PLANTS OF THE PEACE AND UPPER LIARD RIVER REGIONS. By <i>Hugh M. Raup</i>	1
ON CERTAIN EUPHORBIACEAE FROM THE TROPICAL FAR EAST. By <i>Leon Croizat</i>	29
STUDIES OF THE ICACINACEAE, II. HUMIRIANTHERA, LERETIA, MAPPIA AND NOTHAPODYTES, VALID GENERA OF THE ICACINEAE. With four plates. By <i>Richard A. Howard</i>	55
SOME PAPUAN MYRTACEAE. With one plate. By <i>C. T. White</i>	79
NEW BAMBOOS, AND SOME NEW RECORDS, FROM FRENCH INDO-CHINA. By <i>F. A. McClure</i>	93
NOTES ON THE ROOTING OF SOME CONIFERS FROM CUTTINGS. With one text-figure and one plate. By <i>Kenneth V. Thimann</i> and <i>Albert L. Delisle</i>	103
BONPLAND'S "DESCRIPTION DES PLANTES RARES CULTIVÉES À MALMAISON ET À NAVARRE." By <i>William T. Stearn</i>	110
STUDIES IN THE LAURACEAE, IV. PRELIMINARY STUDY OF THE PAPUA- SIAN SPECIES COLLECTED BY THE ARCHBOLD EXPEDITIONS. By <i>Caroline K. Allen</i>	112
RECORDS OF INDO-CHINESE PLANTS, III. By <i>E. D. Merrill</i>	156
THE VEGETATIVE PROPAGATION OF EASTERN WHITE PINE AND OTHER FIVE-NEEDED PINES. With one plate. By <i>Carl G. Deuber</i>	198
A STUDY OF MANIHOT IN NORTH AMERICA. With one text-figure. By <i>Leon Croizat</i>	216
HEDYOTIS LINNAEUS VERSUS OLDENLANDIA LINNAEUS AND THE STATUS OF HEDYOTIS LANCEA THUNBERG IN RELATION TO H. CONSANGUINEA HANCE. With one plate. By <i>E. D. Merrill</i> and <i>F. P. Metcalf</i>	226
STUDIES IN THE THEACEAE, XI. KILLIPIODENDRON. By <i>Clarence E. Kobuski</i>	231
PLANTAE PAPUANAE ARCHBOLDIANAE, IX. By <i>E. D. Merrill</i> and <i>L. M. Perry</i>	233
STUDIES IN THE THEACEAE, XII. NOTES ON THE SOUTH AMERICAN SPECIES OF TERNSTROEMIA. By <i>Clarence E. Kobuski</i>	298
NEW AND CRITICAL CHINESE AND INDO-CHINESE MYRSINACEAE. With two text-figures. By <i>Egbert H. Walker</i>	344
DEGENERIACEAE, A NEW FAMILY OF FLOWERING PLANTS FROM FIJI. With five plates. By <i>I. W. Bailey</i> and <i>A. C. Smith</i>	356

A NOMENCLATURAL NOTE ON THE HIMANTANDRACEAE. By <i>A. C. Smith</i>	366
NEW SPECIES OF CROTON L. FROM NEW GUINEA. By <i>Leon Croizat</i>	369
NEW SPECIES, VARIETIES AND COMBINATIONS FROM THE COLLECTIONS OF THE ARNOLD ARBORETUM. By <i>Alfred Rehder</i>	377
PLANTAE PAPUANAE ARCHBOLDIANAE, X. By <i>E. D. Merrill</i> and <i>L. M. Perry</i>	383
STUDIES OF PAPUASIAN PLANTS, V. By <i>A. C. Smith</i>	417
STUDIES IN THE LAURACEAE, V. SOME EASTERN ASIATIC SPECIES OF BEILSCHMIEDIA AND RELATED GENERA. By <i>Caroline K. Allen</i>	444
STUDIES IN THE THEACEAE, XIII. NOTES ON THE MEXICAN AND CEN- TRAL AMERICAN SPECIES OF TERNSTROEMIA. By <i>Clarence E. Kobuski</i> .	464
STUDIES OF THE ICACINACEAE, III. A REVISION OF EMMOTUM. With four plates. By <i>Richard A. Howard</i>	479
NEW AND CRITICAL EUPHORBIACEAE FROM THE TROPICAL FAR EAST. By <i>Leon Croizat</i>	495
THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED JUNE 30, 1942	509
BIBLIOGRAPHY OF THE PUBLISHED WRITINGS OF THE STAFF AND STU- DENTS, JULY 1, 1941 – JUNE 30, 1942	519
STAFF OF THE ARNOLD ARBORETUM, 1941 – 1942	522
INDEX	523
TITLE-PAGE AND TABLE OF CONTENTS	i-iv

JOURNAL

OF THE

ARNOLD ARBORETUM

VOL. XXIII

JANUARY, 1942

NUMBER 1

ADDITIONS TO A CATALOGUE OF THE VASCULAR PLANTS OF THE PEACE AND UPPER LIARD RIVER REGIONS

HUGH M. RAUP

INTRODUCTION

IN 1934, the writer published a catalogue of the vascular flora of the Peace and Upper Liard River regions of northwestern Canada.¹ The material upon which the catalogue was based consisted principally of collections made during the field season of 1932 by Dr. E. C. Abbe and the writer on a journey to the Mt. Selwyn district. The route followed the railroad from Edmonton, Alberta, to Dawson Creek, B. C., and the Peace River up to the mountains. In the latter part of that season, a trip was made down the full length of the Peace River to Lake Athabaska, and the material collected along the Peace at Carcajou Settlement and above was also included. In addition to these personal collections, such specimens were cited as the writer had access to in the herbaria at Harvard, the New York Botanical Garden, the National Museum of Canada, and the Philadelphia Academy of Sciences, together with a few from the University of Alberta and from Cornell University.

It was clearly understood at the time that this catalogue was little more than an effort to bring together in one place such botanical knowledge of the region as was available, forming a working list for future investigations. The catalogue itself gave evidence of rather serious gaps which would have to be filled before anything approaching a complete floristic treatment could be made. It was noted² that such common or even weedlike forms as *Eleocharis acicularis*, *Juncus bufonius*, *Typha latifolia*, and *Plantago major* were given but limited ranges by the known records. Likewise, it was evident that aquatic floras had never been collected with any degree of thoroughness, and this still appears to be the case. Furthermore, the Upper Peace River region contains a group of young but highly developed agricultural communities in which an abundance of naturalized weeds might be

¹Contributions from the Arnold Arboretum, Harvard University **6**: 1-230, 9 plates, 1 map.

²l. c. p. 7.

expected, but the necessities of the journey of 1932 precluded the possibility of doing justice to this phase of the problem. Consequently, most of the weed flora is absent from the original catalogue.

Additional specimen material has been accumulating steadily since 1934, and most of it has passed through the writer's hands. The original catalogue contained authentic records of 784 species, varieties, and forms, and the list of additions contains no less than 243, bringing the total for the known flora of the region to 1027 species, varieties and forms. Anyone familiar with the progress of botanical collecting in the North will realize that this is still only a working list, for the territory is vast and the regions that have been sampled are only a small fraction of it.

Although the new records have come from a variety of sources which will be noted in detail below, the principal collections are three. The largest number of new records comes from the studies of introduced weeds or "weedy" native plants made by Mr. Herbert Groh, of the Central Experimental Farm at Ottawa. The other large sources are in the collections of Mrs. Mary G. Henry, made during her journey across northern British Columbia in the summer of 1935, and in those of Dr. E. H. Moss, made in the field season of 1941.

In addition to the records of species new to the region, there have been included in the following list a few (32) range extensions. Most of the more recently collected specimens of course make minor extensions of range, but only those have been included which involve large areas of the region as a whole. That is, if a species was previously known only in the plains east of the mountains, but is now known in the latter, or vice versa, these facts have been noted. If a species was previously known by one record, and has subsequently proved to be common and wide-spread, the new data have also been included. Other names appearing in the list have to do principally with changes in nomenclature or in the determinations of specimens collected earlier. There are 49 of these changes, and the writer has attempted to bring the entire catalogue up to date in this regard. Nine species are listed as unverified.

Herbaria consulted in the preparation of the list of additions will be indicated by the following initials: (A) Arnold Arboretum; (B) the herbarium of the Provincial Museum of British Columbia at Victoria; (BU) the herbarium of the University of British Columbia at Vancouver; (Br) the private herbarium of Mr. A. H. Brinkman, Craigmyle, Alberta; (E) the herbarium of the Department of Agriculture, Central Experimental Farm, Ottawa, Canada; (G) Gray Herbarium; (P) the herbarium of the Academy of Natural Sciences, Philadelphia; (UA) herbarium of the University of Alberta at Edmonton. Specimens collected by Mr. E. C. Stacey are at the Agricultural Experiment Station, Beaverlodge, Alberta, except for a few duplicates at the Central Experimental Farm.

The original publication of 1934 is referred to throughout as the *Catalogue*. The order of families and genera in the new list is made to conform as well as possible with that of the *Catalogue*. Since the latter was

arranged chiefly in accordance with Engler and Gilg's *Syllabus der Pflanzenfamilien* (9th and 10th editions), the same work has been followed in the new list.

The collections of Mrs. Mary G. Henry in the season of 1933 were not available until the text of the original catalogue had been set up in type; but it was examined hurriedly, and most of the species which made additions to the flora were included.³ Subsequently this collection was examined more carefully, and was found to contain a few more new records which began the list of additions given in this paper. A brief itinerary of Mrs. Henry's journey of 1933 is as follows: June 28, reached Peace River from Edmonton; July 5, forded Graham River; July 11, camped in Laurier Pass for a few days; July 14, reached Caribou Pass; July 18, Akie Pass; July 19, camped on Akie River for several days; July 22, started return journey; July 25, Caribou Pass; July 31, Laurier Pass; August 2, Cypress Pass; August 7, Hudson Hope. One hundred eighty-nine numbers of flowering plants and ferns were collected on this trip.

Mrs. Henry again visited northern British Columbia in the season of 1935, making a long and difficult journey from Ft. St. John all the way across the northern part of the province to Telegraph Creek. On this occasion she collected 231 numbers and made many additions to the known flora of the region. The following is an abbreviated sketch of this expedition which Mrs. Henry has very kindly contributed.

"On July 10, 1935 I left Ft. St. John, accompanied by my daughter Josephine. Our outfit consisted of five men and twenty-nine horses.

"We followed along the Peace and Halfway Rivers in a northwesterly direction, gradually winding into the mountains. We rode as far as our horses could carry us comfortably each day, usually about fifteen or twenty miles excepting when our way led us through bogs or across rivers.

"We traversed Laurier Pass and crossed the upper Halfway River the 23d. Continuing north we forded the Sikanni Chief River the 25th, the Besa River the 26th, and reached the Prophet River the 31st.

"August 4th we rafted the Musqua River and on the 9th we forded the Tuchodi River and camped on Lake Tuchodi. We spent a few days here mountain climbing, fishing and hunting.

"August 21st we crossed the Chisca River and once again I saw Mt. Mary Henry.

"We camped on the Tetsa River the 22d, and reached the Pass between Mt. St. Paul and Mt. St. George the next day. From here I went off with two men back packing into the mountains for three days to visit Mt. Mary Henry.

"August 31st we forded the Racing River and camped on the Toad River. This part of the country is inhabited by the Sikanni Indians and we frequently found their camps. The chief's son and two relatives joined us here for the remainder of our journey while two of our men returned with some of the horses.

³l. c. p. 23, footnote.

"We reached Muncho Lake September 3d and went over the Gundahoo Pass September 4th.

"We crossed the Rabbit River the 9th, the Kechika River the 11th and over Sand Creek Pass the 15th.

"We reached McDame Creek and Dease River September 22d, after covering about 1200 miles on horse and foot and for the fourth year adding new mountains and other features to Canada's map."

On all of Mrs. Henry's trips, she has had as guide Mr. K. F. McCusker, formerly of the Canadian Topographical Survey, who has carefully located the routes and contributed substantially to the maps of the country. These maps may be consulted for more details on the localities visited.⁴

Mr. Herbert Groh began his weed surveys in the Peace River agricultural districts in the autumn of 1929, after which a brief provisional review was published.⁵ Most of his work of this season consisted in the accumulation of field notes in the vicinity of Beaverlodge, Alta., and along the roads between there and Pouce Coupé, B. C., and in the direction of Grande Prairie. It was done on Oct. 8-11, inclusive, and was the beginning of a series of surveys, made every five years, to provide "for at least one such area in Canada a more or less adequate weed history." A second, more extended journey was made in the three weeks beginning Aug. 28, 1934, during which Mr. Groh visited all of the principal farming districts of the Peace River region. On this trip he made copious notes and much larger collections than were possible in 1929. A short trip was also made in 1935 to settlements on the Athabaska River (Athabaska and Barrhead). As a result of these field studies a bulletin was published⁶ containing a comprehensive list of species and a table showing their general distribution within the region. The present writer has drawn freely upon this excellent paper for notes on frequency and local distribution, and has made direct quotations from it in many cases. The use made of it in the following list, however, does not begin to do it justice, for only such items were selected as made additions to the catalogue of 1934.

In 1939 Mr. Groh again visited the Peace River country, beginning his collections on Aug. 22, and finishing them on Sept. 21. He re-examined most of the agricultural districts, returning with a much larger collection than had been made on previous trips. This collection, of approximately

⁴Most of the localities mentioned by Mrs. Henry are to be found on the following maps: National Topographic Series, sheet No. 94 S. E. (Hudson Hope); British Columbia, sheet no. 94 B (Halfway River); Northern British Columbia, map no. 1-H, published in 1933. Mrs. Henry published a rather detailed and sumptuously illustrated paper in the *National Horticultural Magazine* (**13**: 60-75, 162-181, 269-290, 363-383, 1934). The photographs in this paper include many habit pictures of the plants of the region, and the article is replete with notes on flower color and the local habitat selection of species.

⁵GROH, H. Grande Prairie Weeds — A Provisional Review. Dept. Agr. Can. Pamphlet No. 117, N.S., 1930.

⁶GROH, H. Peace-Athabaska Weeds, a Reconnaissance Appraisal. Dept. Agr. Can. Publ. no. 556, Tech. Bull. no. 7, 1937.

440 field members, has served to verify most of his earlier field notes, and has made substantial contributions to our knowledge of the flora.

Mr. Groh's collections of 1929, 1934, and 1935 were not numbered. Consequently, in citing them the dates on which they were made have been included. The 1939 collections, however, have serial field numbers by which they are cited, and the following itinerary is needed to make the data complete.

DATES	LOCALITIES	FIELD NUMBERS
Aug. 22	Watino, Spirit River	642-644
Aug. 23-24	Beaverlodge, South Wapiti	645-691
Aug. 25	Saskatoon Mt., and Vicinity, near Beaverlodge	1216, 692-716
Aug. 27	Attachie, B. C., and along Halfway R., near Farrell, B. C.	718-722
Aug. 28-31	Hudson Hope, B. C.	723-817
Sept. 1	Bear Flat, B. C.	818
Sept. 2	Taylor, B. C., and Vicinity	819-831
Sept. 4	Dawson Creek, B. C., and Rolla, B. C.	832-836
Sept. 6	Beaverlodge, Lower Beaverlodge, and Hythe	837-859, 1181
Sept. 7	Beaverlodge and Huallan	860-863
Sept. 8	Grande Prairie	864-881
Sept. 9	Beaverlodge, Wembley	882-885
Sept. 10	Grande Prairie	886-891
Sept. 11-12	Grande Prairie and Vicinity (Bear L., Kleskun L.)	892-923
Sept. 12-13	Spirit River and Vicinity	924-981
Sept. 14	Ryecroft, Wanham, Watino, McLennan, Girouxville	982-994
Sept. 15	Hines Creek, Brownvale	995-1012
Sept. 16	Griffin Creek, Grimshaw, Berwyn, Peace River	1013-1035
Sept. 17	McLennan, Kathleen, and L. Kimiwan	1036-1053
Sept. 18	Kenzie, High Prairie	1054-1061
Sept. 19	Grouard and Vicinity, (Prairie Echo, High Prairie, Salt Prairie, Heart River, Enilda, Grouard)	1062-1077
Sept. 21	Calahoo, Rockfort Bridge, Greencourt, Meyerthorpe	1080-1087
Sept. 23-24	Bonnyville, St. Paul, Cold Lake	1088-1119, 1217, 1218

The collections of Sept. 23-24 are from northeast of Edmonton, so that they are not in our region. Those of Sept. 21 have been included, however, as they come from the Athabaska drainage.

A few miscellaneous collections by other workers have come through Mr. Groh as loans from the herbarium of the Experimental Farm at Ottawa. The names of these collectors are included in the list, with dates and localities.

Dr. E. H. Moss of the University of Alberta has very kindly gone through his field notes and collections from the Peace-Athabaska district in search of records that would make additions to the flora. Records of his collections of 1934 are included here, as are also a few from his trip of 1931 which

escaped notice in the original catalogue. In 1941 Dr. Moss again visited the district and collected about 200 numbers of flowering plants and ferns which have yielded many additions. His itinerary for this trip is as follows:

DATES	LOCALITIES	FIELD NUMBERS
July 15	Slave Lake	6053-6072
July 15-16	Widewater, Lesser Slave L.	6073-6080
July 16	Canyon Creek, Lesser Slave L.	6081
July 16-18	Peace River	6084-6138
July 19	Dixonville, N. of Grimshaw	6139-6154
July 19	White Mud R., N. of Grimshaw	6156-6157
July 20-21	Notikewin and vicinity	6158-6193
July 22-24	Faust, Lesser Slave L.	6194-6231
July 25	Canyon Creek, Lesser Slave L.	6238-6248
July 26	Martin River and vicinity, N. shore of Lesser Slave L.	6249-6278
July 27-28	Canyon Creek, Lesser Slave L.	6280-6291
July 29	Smith	6298-6304

Most of the records for the Lesser Slave Lake District in the original catalogue were cited from specimens collected by Mr. A. H. Brinkman of Craigmyle, Alberta. These were seen at the herbarium of the New York Botanical Garden, or were loaned from Cornell University. Since then Mr. Brinkman has very kindly supplied a comprehensive numerical list of his collections about Lesser Slave Lake, from which many additional records have been drawn. He has also loaned a number of specimens so that doubtful records could be checked.

In the summer of 1930 the Pacific Great Eastern Railway made an extended topographical and geological survey of the upper Peace River. A geological assistant in the field party, Dr. Roy Graham, made a rather large collection of plants which is now to be found at the University of British Columbia. A list of species and a general description of the vegetation, together with an itinerary, were published by Dr. Graham in 1934.⁷ Small collections were made on June 22 on a small island in the Peace River at Finlay Forks, and on June 23 along Lost Cabin Creek, a small tributary to the Peace about 3 miles east of Finlay Forks. The main collection was made between June 28 and the end of August in the southern half of what is known as the "Dominion Block," or the "Peace River Block," a partially agricultural district approximately between latitudes $55^{\circ}30'$ and $56^{\circ}45'$, and longitudes 120° and 122° . The following is a condensed itinerary given by Graham (l. c. p. 14). "From Hudson Hope by boat down the Peace to the Alberta boundary and back to Hudson Hope; then by pack-train southward to the west end of Moberly Lake, and on to East Pine via Jackfish Lake; from East Pine by pack-train up the Pine River to Peavine Flats (about 7 miles west of the Block boundary) and back to East Pine;

⁷GRAHAM, ROY. Notes on the Flora of the Peace River. Rept. of the Prov. Mus. Nat. Hist., B.C., for 1933, pp. 13-24 (1934).

from there northward and eastward to Sunset Prairie, and then southward and eastward through Kiskatinaw (Arras), finishing up the season at Dawson Creek."

About 250 species of flowering plants and ferns are listed by Graham. The writer has seen only a few of the specimens (39), selected because they seemed to make unique additions to the known flora of the district.⁸ Most of the other records published by Graham which are additions to the catalogue of 1934 have been substantiated by material from other collectors (chiefly from Mr. Groh and Mrs. Henry), but these records are mentioned in the new list. A few of Graham's records, however, still remain unchecked, and are included in the list provisionally.⁹

A considerable number of specimens have been sent to the writer from the herbarium of the Provincial Museum of British Columbia at Victoria. These were collected by several people who were either living in the Peace River district or travelling there, and whose names are given in the list along with the localities and dates of their collections. The largest single collection in this group was made in the spring and summer of 1938 by Mr. I. McT. Cowan, and contains 44 field numbers. A few records from this museum also reached the writer through Dr. G. N. Jones, to whom the specimens had been sent for determination.

A very interesting collection, principally of grasses and sedges, was loaned by Mr. E. C. Stacey of the Agricultural Experiment Station at Beaverlodge. The specimens were gathered in the summers of 1925 and 1926 in the Beaverlodge district, and were in support of an excellent thesis prepared by Mr. Stacey describing the vegetation of that district. Unfortunately this paper remains unpublished.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the many kindnesses bestowed by the persons who have contributed material for this paper. The writer is particularly indebted to Mr. Herbert Groh, to Mrs. Mary G. Henry, and to Dr. E. H. Moss for entrusting him with their large collections of specimens, and for their patience in answering the many queries that came up as the

⁸Most of these additions proved to be based upon misdeterminations. The following are the names under which they appeared in Graham's published list, with the necessary corrections: *Phegopteris alpestris* = *Athyrium Filix-femina*, *Juniperus scopulorum* = *J. horizontalis*, *Juncus oreganus* = *J. alpinus*, *Maianthemum bifolium* = *M. canadense* var. *interius*, *Sisyrinchium idahoense* = *S. angustifolium*, *Goodyera Menziesii* = *G. repens*, *Urtica Lyallii* = *U. gracilis*, *Stellaria umbellata* = *S. longipes*, *Actaea spicata* and *A. arguta* = *A. rubra*, *Aconitum columbianum* = *A. delphinifolium*, *Heuchera cylindrica* = *H. Richardsonii*, *Oxytropis monticola* = *O. spicata*, *O. Lambertii* = *O. splendens*, *Osmorhiza nuda* = *O. obtusa*, *Vaccinium oreophilum* = *V. caespitosum*, *Mertensia ciliata* = *M. paniculata*, *Rhinanthus Crista-galli* = ? *R. Kyrollae*, *Lonicera ciliosa* = *L. glaucescens*, *Aster occidentalis* = *A. juncus*, *Antennaria anaphaloides* = *A. campestris*, *Senecio Balsamitae* = *S. pauperculus*, *Hieracium umbellatum* = ? *H. canadense*.

⁹These unverified records are: *Corallorrhiza Mertensiana*, *Stellaria crispa*, *Cardamine oligosperma*, *Oenanthe sarmentosa*, *Veronica Anagallis-aquatica*, *Crepis virens*.

material was studied. Likewise Mr. A. H. Brinkman and Mr. E. C. Stacey have provided valuable data directly from their personal notes and collections. Thanks are due to Dr. Francis Kermode, Director of the Provincial Museum of British Columbia, and to Mrs. Winifred V. Hardy, its Recorder of Botany, for arranging the loan of specimens; and to Professor John Davidson of the Department of Botany at the University of British Columbia for the loan of specimens collected by Dr. Roy Graham. The writer wishes also to express his appreciation for the notes contributed on the genus *Polemonium* by Dr. E. T. Wherry of the University of Pennsylvania; and for those of Dr. Francis W. Pennell, of the Philadelphia Academy of Science, on *Castilleja*. He is also indebted to Dr. Pennell for arranging the loan of Mrs. Henry's collections from the Philadelphia Academy.

OPHIOGLOSSACEAE

Botrychium multifidum (Gmel.) Rupr. — *B. matricariaefolium* (Schrank.) Spreng. — *B. ternatum* (Thimb.) Sw. var. *rutaeifolium* (A. Br.) D. C. Eat. — See Rept. Mich. Acad. Sci. **18**: 86 (1916). — Fort St. John Road, B. C., S. of Peace R., wooded bank of stream, *Groh*, Sept. 17, 1934 (E); among willows in sand dunes, Lesser Slave Lake, Alta., *Moss*, no. 2888 (UA).

POLYPODIACEAE

Dryopteris Linnaeana C. Chr. — *Thelypteris Dryopteris* (L.) Slosson. — This and the following four species were cited in the *Catalogue* under the genus name *Thelypteris*, and should now be placed under *Dryopteris*. The necessary synonymy is given herewith.

Dryopteris Robertiana (Hoffm.) C. Chr. — *Thelypteris Robertiana* (Hoffm.) Slosson.

Dryopteris fragrans (L.) Schott. — *Thelypteris fragrans* (L.) Nieuwl.

Dryopteris spinulosa (O. F. Muell.) Watt. — *Thelypteris spinulosa* (O. F. Muell.) Nieuwl.

Dryopteris spinulosa (O. F. Muell.) Watt. var. **dilatata** (Hoffm.) Watt. — *T. s.* var. *dilatata* (Hoffm.) St. John.

EQUISETACEAE

Equisetum arvense L. forma **serotina** (G. F. W. Mey.) Milde. — Tupper Cr., B. C., *Cowan*, no. 10819 (B), June 7, 1938. — This form is apparently rare. The fruiting fronds turn green and produce branches like those of the sterile fronds.

Equisetum fluviatile L. — Specimens cited in the *Catalogue* under *E. limosum* L. should bear the above name.

LYCOPODIACEAE

Lycopodium clavatum L. — Lesser Slave L. district, *Brinkman*, no. 4676 (Br) — The typical species was not included in the *Catalogue*; only vars. *monostachyon* and *megastachyon*.

PINACEAE

Picea glauca Voss var. **albertiana** (S. Brown) Sarg. — Most of the material cited in the *Catalogue* as typical *P. glauca* probably belongs to this western variety.

Picea Engelmanni (Parry) Engelm. — Laurier Pass, B. C., alt. 4200', *Mrs. Henry*, no. 661 (A). — This material is typical of the species, and does not appear to merge with *P. glauca* as does that collected in the Peace River pass.

Abies balsamea (L.) Mill. — Canyon Creek, Lesser Slave L., *Moss*, no. 6238 (UA, G). — Dr. Moss reports (personal communication) this species is common in the Widewater-Canyon Creek district, and states that he saw no *A. lasiocarpa*.

Pinus Banksiana Lamb. — *P. divaricata* of auth. — McLennan, Alta., *Groh*, no. 1049 (E); Saskatoon Mt., near Beaverlodge, Alta., *Groh*, no. 693 (E). — The finding of *P. Banksiana* in this region accentuates the overlapping of cordilleran and eastern

forest affinities in the upper Peace River country (see *Catalogue*, p. 79). The taxonomic relationship between *P. Banksiana* and *P. contorta* var. *latifolia* (*P. Murrayana*), especially in the region of overlap, is worthy of further study. After his journey of 1941, Dr. E. H. Moss makes the following comments (personal communication): "*Pinus Banksiana* seems to prevail at Smith and on the north shore of Lesser Slave Lake opposite Widewater and Canyon Creek. Between Lesser Slave Lake and Peace River *P. Banksiana* and *P. Murrayana* were observed. At Peace River town both species grow intermixed, with jackpine predominating. Trees showing intermediate characters were rather common in the Slave Lake - Peace River region." It is his opinion "that lodgepole pine is less prevalent than jackpine in the Lesser Slave Lake - Peace River (town) region."

TYPHACEAE

***Typha latifolia* L.** — Slave Lake, *Moss*, no. 6072 (UA). — Reported in the Peace River region by John Macoun in 1872; and Groh lists it as common in the Peace-Athabaska farming country.

SPARGANIACEAE

***Sparganium multipedunculatum* (Morong) Rydb.** — White Mud R., N. of Grimshaw, Alta., *Moss*, no. 6175 (UA). — John Macoun's record for *S. simplex*, between Lesser Slave L. and Hudson Hope in 1872 probably refers to this species. See *Rhod.* **27**: 190 (1925).

POTAMOGETONACEAE

***Potamogeton praelongus* Wulf.** — Shore of Tuchodi L., B. C., alt. 4200', *Mrs. Henry*, no. 851 (G, P).

***Potamogeton Richardsonii* (A. Benn.) Rydb.** — Blue L., B. C., *Mrs. Henry*, no. 807 (G, P); Lesser Slave L. District, *Brinkman*, no. 3907 (Br); Faust, Lesser Slave L., *Moss*, no. 6203 (UA).

***Potamogeton Friesii* Rupr.** — Blue L., B. C., *Mrs. Henry*, no. 805 (G, P).

***Potamogeton pusillus* L. var. *tenuissimus* Mert. & Koch.** — Near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6278 (UA, G).

***Potamogeton pectinatus* L.** — In small lime-encrusted lake 15 mi. E. of Kechica R., B. C., alt. 2000', *Mrs. Henry*, no. 927 (G, P); Blue L., B. C., *Mrs. Henry*, no. 808 (G, P); Faust, Lesser Slave L., *Moss*, no. 6202 (UA).

SCHEUCHZERIACEAE

***Triglochin palustre* L.** — Springy ground, Montney, B. C., *Groh*, Sept. 5, 1934 (E); muddy creek margin, Peace River, Alta., *Moss*, no. 6109 (UA, G). — Not previously reported in the Peace River district east of the mountains.

GRAMINEAE

***Bromus inermis* Leyss.** — Reported by Graham in the Peace River Block, B. C., and stated by Groh to be extensively escaped in the Peace River agricultural districts.

***Bromus Porteri* Nash.** — Dry hillside, Peace River, Alta., *Groh*, no. 1026 (E, G).

***Bromus secalinus* L.** — reported by Groh along a roadside near Donnelly, Alta., in 1934.

***Festuca saximontana* Rydb.** — See *Rhod.* **37**: 250-2 (1935). — Beaverlodge district, Alta., *Stacey*, no. 35; sandy tract, Hudson Hope, B. C., *Groh*, no. 773 (E, G); prairie near Peace River, Alta., *Moss*, no. 6133 (UA, G). — Records of *Festuca ovina* by Graham, Brinkman and Raup are probably all referable to this species.

***Fluminia festucacea* (Willd.) Hitchc.** — Reported by Brinkman at Marion L., Alta. His specimens (no. 3955) were determined by the late Dr. A. S. Hitchcock. Reported by John Macoun in 1872 (as *Festuca borealis*) between Lesser Slave L. and Hudson Hope, and probably common in wet meadows in many parts of the region.

***Glyceria grandis* S. Wats.** — Beaverlodge district, Alta., *Stacey*, no. 3; Faust, Lesser Slave L., *Moss*, no. 6198 (UA, G).

***Puccinellia distans* (L.) Parl. var. *tenuis* (Vechtritz) Fern. & Weatherby.** — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); ditches and along railway, Spirit River, Alta., *Groh*, nos. 644, 945 (E).

Puccinellia Nuttalliana (Schultes) Hitchc. — *P. airoides* (Nutt.) Wats. & Coult. — Clyde, Alta., *Groh*, July 4, 1935 (E); McLennan, *Groh*, Sept. 15, 1934 (E); Berwyn, Alta., *J. L. Kerns*, Aug. 15, 1939 (E, G); moist ravine, Spirit River, Alta., *Groh*, no. 937 (E, G); muddy creek margin, Peace River, Alta., *Moss*, no. 6108 (UA, G). — The record of John Macoun for *Glyceria airoides* at saline springs along the Peace River above the Smoky probably belongs here.

Poa annua L. — Dawson Creek, B. C., *Groh*, Sept. 1, 1934 (E); garden at Brownvale, Alta., *Groh*, no. 1011 (E). — Reported by Brinkman in the Lesser Slave L. district, and noted by Groh as a troublesome lawn weed in parts of the Peace River agricultural district.

Poa abbreviata R. Br. — Specimens cited in the *Catalogue* under *P. laxa* Haenke belong here.

Poa compressa L. — Beaverlodge district, Alta., *Stacey*, no. 12; railway yards, Spirit River, Alta., *Groh*, no. 933 (E, G). — Reported by Groh as fairly well distributed throughout the Peace River agricultural district.

Poa nervosa (Hook.) Vasey. — Beaverlodge district, Alta., *Stacey*. — On this specimen is the note, "Collected by Godfrey, July 12, 1932, in plots," suggesting that it was introduced.

Poa trivialis L. — Reported by Brinkman in the Lesser Slave L. district. His specimens (no. 4302) were determined by the late Dr. A. S. Hitchcock.

Distichlis stricta (Torr.) Rydb. — See Rhod. **27**: 67 (1925). — Alkali slough, Bear L., near Grande Prairie, Alta., *Groh*, no. 894 (E, G). — John Macoun's record of *Brizopyrum spicatum* at saline springs along the Peace R. above the Smoky is undoubtedly referable to this species. It has been found to be common in saline areas in the wood Buffalo Park (Raup, Bot. Invest. Wood Buff. Park, 1935, p. 104).

Agropyron repens (L.) Beauv. — Railway, Peace River, Alta., *Groh*, Sept. 12, 1934 (E); Grande Prairie, Alta., *Groh*, Oct. 11, 1934 (E). — Groh states that this species "is spreading in the West, has already a strong foothold in the Athabaska district, and has increased some in the Grande Prairie and other districts since 1929, when it was found at Beaverlodge and Grande Prairie." Reported by Graham in the Peace River Block, B. C.

Agropyron repens (L.) Beauv. var. **subulatum** (Schreb.) Reichenb. — See Rhod. **35**: 182-5 (1933). — Berwyn, Alta., *Groh*, Sept. 13, 1934 (E); roadside, Prairie Echo, Alta., *Groh*, no. 1073 (E).

Agropyron Smithii Rydb. — Railway, Beaverlodge, Alta., *Groh*, no. 861 (E, G); railway at Greencourt, Alta., *Groh*, no. 1085 (E, G). — Reported as a weed by Groh in most parts of the Peace River agricultural district.

Agropyron dasystachyum (Hook.) Scribn. var. **subvillosum** Scribn. & Sm. — Dry hills, Hudson Hope, B. C., *Groh*, no. 798 (E, G). — The combination *Agropyron dasystachyum* was wrongly attributed to Vasey in the *Catalogue*, p. 124.

Agropyron riparium Scribn. & Sm. — Beaverlodge district, Alta., *Stacey*, no. 17-a. — This material appears to be a good match for a duplicate of the type found in the Gray Herbarium.

Agropyron trachycaulum (Link) Malte var. **glaucum** (Pease & Moore) Malte. — Prairie soil, Spirit River, Alta., *Groh*, no. 951 (E, G). — These plants have somewhat pubescent glumes which match a part of the type of var. *pilosiglume* Malte in the Gray Herbarium. This variety, however, may not be worthy of distinction. It was reduced to var. *glaucum* by Fernald in Rhod. **35**: pl. 244 (1933).

Agropyron trachycaulum (Link) Malte var. **novae-angliae** (Scribn.) Fern. — Railway at Hythe, Alta., *Groh*, no. 855 (E, G). — Not previously reported in the upper Peace River district east of the mountains.

Secale cereale L. — Groh states that the rye "volunteers wherever grown," and thus becomes a weed in succeeding crops.

ELYMUS GLAUCUS Buckl. — Noted by John Macoun in 1872 between Lesser Slave L. and Hudson Hope, and by Graham in the Peace River Block, B. C.

Hordeum jubatum L. — Beaverlodge district, Alta., *Stacey*, no. 5, and *Malte*, July 17, 1921 (E); sandy tract, Hudson Hope, B. C., *Groh*, no. 766 (E, G). A common

native grass which becomes weedy in waste cleared areas. No specimens of it were available when the *Catalogue* was published, and its extent was not known.

Trisetum spicatum (L.) Richter var. **molle** (Michx.) Beal. — Notikewin, Alta., *Moss*, no. 6177 (UA). — Not previously noted in the upper Peace - Athabaska district east of the mountains.

Avena sativa L. — Baldonnel, B. C., *Groh*, Sept. 5, 1934 (E).

Avena Hookeri Scribn. — Beaverlodge district, Alta., *Stacey*, no. 13.

Danthonia intermedia Vasey. — Low open place near poplar thicket, Sexsmith, Alta., *Moss*, no. 1797 (UA); prairie, Notikewin, Alta., *Moss*, no. 6161 (UA, G). — Noted in the *Catalogue* only from the mountains (mouth of Wicked R.).

Calamagrostis canadensis (Michx.) Nutt. — Beaverlodge district, Alta., *Stacey*, no. 1; sandy lake shore, Canyon Creek, Lesser Slave L., *Moss*, no. 6247 (UA, G). — The typical species not previously reported, though the larger-flowered varieties are well-known in the upper Peace country.

Calamagrostis canadensis (Michx.) Nutt. var. **robusta** Vasey. — Near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6274 (UA, G). — Not previously noted in the upper Peace - Athabaska district east of the mountains.

Calamagrostis neglecta (Ehrh.) Gaertn. — Reported by Brinkman near Fawcett L. His specimens (no. 3892) were determined by the late Dr. A. S. Hitchcock.

Agrostis stolonifera L. — See Ann. Rept. Nat. Mus. Can. for 1926, pp. 105-26 (1928). — Hythe, Alta., *Groh*, Aug. 31, 1934 (E). — Groh's specimens appear to represent the variety *compacta* Hartm. Graham's record of *A. alba* in the Peace River Block, B. C., probably belongs under this species.

Agrostis scabra Willd. — Dry roadside, Hudson Hope, B. C., *Groh*, no. 728 (E, G); prairie sod, Spirit River, Alta., *Groh*, no. 954 (E, G); dry prairie, Beaverlodge, Alta., *Groh*, no. 661 (E); Beaverlodge district, Alta., *Stacey*, no. 6. — Not recorded in *Catalogue* east of mountains. Groh states that it "increases sometimes in hay meadows to the detriment of quality." This is also the case in the Wood Buffalo Park (Raup, Bot. Invest. Wood Buff. Pk., 1935, p. 86).

Cinna latifolia (Trev.) Griseb. — Dry poplar woods, Hudson Hope, B. C., *Groh*, no. 746 (E, G); Beaverlodge district, Alta., *Stacey*, no. 27. — Not previously reported east of the mountains; specimens collected by Brinkman in the Lesser Slave Lake district not examined.

Alopecurus aequalis Sobol. — Pouce Coupé, B. C., *Groh*, Sept. 1, 1934 (E); McLennan, Alta., *Malte*, July 22, 1921 (E); Beaverlodge, Alta., *Malte*, July 17, 1921 (E); slough, Beaverlodge, Alta., *Groh*, no. 675 (E, G); lake shore, Grouard, Alta., *Groh*, no. 1065 (E); Beaverlodge district, Alta., *Stacey*, no. 25. — Not previously recorded in the upper Peace River district east of the mountains.

Muhlenbergia squarrosa (Trin.) Rydb. — Moist ravine, Spirit River, Alta., *Groh*, no. 936 (E, G); railway, Beaverlodge, Alta., *Groh*, no. 845 (E, G). — John Macoun's record for *Vilfa cuspidata* between Lesser Slave Lake and Hudson Hope may belong here. Mr. Groh's plants appear to represent the erect form of the species which has gone by the name of *M. Richardsonis* (Torr.) Rydb. A record of it in the Wood Buffalo Park was published under this name (Raup, Bot. Invest. Wood Buff. Park, 1935, p. 109).

Stipa columbiana Macoun. — Beaverlodge district, Alta., *Stacey*, no. 23a; *Groh*, Aug. 29, 1934 (E, G); dry field, Lower Beaverlodge, Alta., *Groh*, no. 842 (E, G); sandy loam, bank of drift soil, Spirit River, Alta., *Groh*, no. 979 (E, G); grassland near Rolla, B. C., *Moss*, no. 2380 (UA); dry valley slopes, Peace River, Alta., *Moss*, nos. 6085, 6131 (UA, G). — Groh's plant, no. 979, appears to be intermediate between this species and *S. viridula*. It has a few hairs at the throats of the lower sheaths.

Stipa Richardsonii Link. — Pouce Coupé, B. C., *Malte*, July 15, 1921 (E); sandy tract, Hudson Hope, B. C., *Groh*, no. 762 (E, G).

Phalaris canariensis L. — In yards, Dawson Creek, B. C., *Groh*, Sept. 1, 1934 (E); roadside, Spirit River, Alta., *Groh*, no. 969 (E, G). — Mr. Groh also reports this species at Pouce Coupé, growing about railway yards.

Phalaris arundinacea L. — Beaverlodge district, Alta., *Stacey*, no. 8; border of slough, Slave Lake, Alta., *Moss*, no. 6062 (UA, G). — Previously reported by John

Macoun between Lesser Slave Lake and Hudson Hope, and probably common in wet meadows throughout.

Setaria viridis (L.) Beauv. — Railway yards, Berwyn, Alta., *Groh*, no. 1018 (E). — Also reported by Groh at Ft. St. John, B. C., Fairview and Peace River, Alta.

CYPERACEAE

Eriophorum medium Anders. — A specimen cited in the *Catalogue* under *E. chamissonis* forma *albidum* should bear the above name. See Hultén, *Fl. Kamtchatka* 1: 161 (1927) for a recent discussion.

Eriophorum viridicarinatum (Engelm.) Fern. — Cited in the *Catalogue* from the mountains, but now reported by Brinkman in the Lesser Slave L. district (no. 3887). Specimens not examined.

Eriophorum angustifolium Roth. — Moist sand on bank of Musqua R., B. C., *Mrs. Henry*, no. 787 (G, P).

Eleocharis palustris (L.) R. & S. var. **major** Sonder. — According to the monographer of the genus, Dr. H. K. Svensen, at least a part of the material cited in the *Catalogue* under the typical species (Raup & Abbe, no. 4330) should be referred to var. *major*.

Kobresia Bellardi (All.) Degl. — A single individual of this species was overlooked on a sheet of *Carex nardina* var. *Hepburnii* collected by Raup & Abbe (no. 3916) on the west slope of Mt. Selwyn, alt. 45000'. It may be that other sheets of this number will also contain it.

Carex stenophylla Wahl. var. **enervis** (C. A. Mey.) Kükenth. — Specimens cited in the *Catalogue* as the typical species should be referred to this variety.

Carex stipata Willd. — Open place in aspen woods, Faust, Lesser Slave L., *Moss*, no. 6212 (UA).

Carex interior Bailey. — Reported by Brinkman in the Lesser Slave L. district (no. 3881), but specimens not examined. Not previously noted in the Peace River region east of the Mountains.

Carex aenea Fern. — Low place in aspen woods west of Hythe, Alta., *Moss*, no. 2386 (UA).

Carex sychnocephala Carey. — Sandy lake shore, Faust, Lesser Slave L., *Moss*, no. 6231 (UA, G).

Carex macloviana Urv. — McLeod L., B. C., *John Macoun*, 1875. — This specimen, in the Gray Herbarium, was overlooked in the preparation of the *Catalogue*. The species was reported by Graham in the Peace River Block, B. C.

Carex scirpoidea Michx. — Not noted in the *Catalogue* east of the Mountains, but reported by Brinkman in the Lesser Slave L. district (no. 4653).

Carex Garberi Fern. var. **bifaria** Fern. — See Rhod. 37: 253-5 (1935). — Material cited in the *Catalogue* under *C. Hassei* Bailey should be referred to this species.

Carex paupercula Michx. var. **irrigua** (Wahl.) Fern. — Edge of small lake in muskeg, Smith, Alta., *Moss*, no. 6301 (UA).

Carex angarae Steud. — Material cited in the *Catalogue* under *C. VahlII* var. *infernalpina* should be referred to this species according to A. E. Porsild in Rhod. 41: 203-5 (1939).

Carex Kelloggii Boott. — Slough along Peace R. about 6 mi. below the mouth of the Wicked, *Raup & Abbe*, nos. 4019, 4022. — These numbers were cited in the *Catalogue* under *C. lenticularis* Michx., but Mr. J. W. Stacey, who has since been over the collection, has identified them as above.

Carex misandra R. Br. — Caribou Pass, B. C., alt. 6800', *Mrs. Henry*, no. 624 (G, P). — Also reported by Graham in the Peace River Block, B. C.

Carex lanuginosa Michx. — Beaverlodge district, Alta., *Stacey*, no. 31.

Carex montanensis Bailey. — Damp turfy slope on Mt. Selwyn, alt. about 4500'. *Raup & Abbe*, no. 4145. — cited in the *Catalogue* under *C. ambusta* Boott.

Carex trichocarpa Muhl. var. **aristata** (R. Br.) Bailey. — *C. atherodes* Spreng. — Low place on sandy lake shore, Canyon Creek, Lesser Slave L., *Moss*, no. 6243

(UA, G). — Previously reported, without specimens, near Hudson Hope by Raup in 1932.

Carex retrorsa Schw. — Low place in virgin poplar-spruce forest, Widewater, Lesser Slave L., *Moss*, no. 6074 (UA, G). — Not previously reported in the upper Peace - Athabaska country east of the mountains.

LEMNACEAE

Lemna trisulca L. — In small lake surrounded by muskeg, Smith, Alta., *Moss*, no. 6299-a (UA). — Reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Spirodela polyrhiza (L.) Schleid. — Stagnant pool, High Prairie, Alta., *Groh*, no. 1077 (E, G).

JUNCACEAE

Juncus bufonius L. — Wet ground, Widewater, Alta., *Groh*, Sept. 17, 1934 (E); by stream, Mayerthorpe, Alta., *Groh*, no. 1087 (E); open place in aspen woods, Faust, Lesser Slave L., *Moss*, no. 6213 (UA, G). — Previously reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Juncus Dudleyi Wieg. — Sandy lake shore at edge of stream mouth, Faust, Lesser Slave L., *Moss*, no. 6204 (UA, G).

Juncus alpinus Vill. var. **rariflorus** (Hartm.) Hartm. — *J. alpinus* var. *insignis* Fries. — *J. Richardsonianus* Schultes. — See Botaniska Notiser 1932, pp. 313-72, and Rhod. **35**: 233-4 (1933). — Sandy shore, Faust, Lesser Slave L., *Moss*, no. 6206 (UA); near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6276 (UA, G). — This variety is occasional in the central part of the Mackenzie basin, but not previously reported in the southwestern portions.

Juncus castaneus Smith. — Damp moss on sunny hillside, 10 mi. W. of Mt. Dame, B. C., *Mrs. Henry*, no. 949 (G, P).

Luzula arcuata Wahl. — Near small lake on W. slope of Mt. Selwyn, alt. about 5000', *Raup & Abbe*, no. 4098. — This specimen was erroneously cited in the *Catalogue* under *L. parviflora*.

LILIACEAE

Lilium philadelphicum L. var. **andinum** (Nutt.) Ker. — Peace River, Alta., *Mrs. Henry*, no. 662 (G, P); Saskatoon Mt., near Beaverlodge, Alta., *Groh*, no. 701 (E, G). — Only a yellow-flowered forma *immaculatum* of this variety was previously reported in the upper Peace River region.

Asparagus officinalis L. — Noted by Groh as an occasional wayside escape in the agricultural district.

Streptopus amplexifolius (L.) DC. var. **americanus** Schultes. — Specimens cited in the *Catalogue* under the typical species should be referred to this variety according to Dr. N. C. Fassett in Rhod. **37**: 88-113 (1935).

ORCHIDACEAE

Habenaria viridis (L.) R. Br. var. **interjecta** Fern. — Specimens cited in the *Catalogue* under var. *bracteata* probably all belong here (see Rhod. **28**: 173, 1926). Also collected by Groh at Hudson Hope, B. C. (no. 792, E), in the Beaverlodge district, Alta., by Stacey, and at Bear Flat, B. C., by Freer (no. 10206, B).

Goodyera repens (L.) R. Br. — Specimens cited in the *Catalogue* under *Epipactis repens* should bear this name.

Goodyera decipiens (Hook.) Hubbard. — Specimens cited in the *Catalogue* as *Epipactis decipiens* belong under this name.

Corallorrhiza striata Lindl. — Peace River district, B. C., *Miss Bertrand*, 1933, no. 9430 (B).

CORALLORRHIZA MERTENSIANA Bong. — Reported by Graham in the Peace River Block, B. C.

SALICACEAE

Salix MacCalliana Rowlee. — Moist meadow, Deep Creek, B. C., *Mrs. Henry*,

no. 675 (A, P); meadow near stream east of Rabbit R., B. C., *Mrs. Henry*, no. 919 (A, P); dry muskeg, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6143 (UA, G).

Salix glauca L. — Dry muskegs, Notikewin, Alta., *Moss*, no. 6167 (UA, G), and Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6142 (UA, G). — Noted in the *Catalogue* only from the mountains. Brinkman reports it (as var. *glabrescens* Schn.) in the Lesser Slave L. district (no. 4657), but his specimens have not been seen by the writer.

Salix discolor Muhl. — Some sterile specimens cited in the *Catalogue* under *S. arbusculoides* suggest this species, and there is a sterile specimen at the National Herbarium of Canada, collected by C. R. Ball, 17 mi. N. E. of Clyde, Alta., which has been named *S. discolor*. Another sterile twig, collected by Groh along a roadside at Grande Prairie, Alta., (no. 886, E, A), probably also belongs here; and one collected by Brinkman (no. 3869) at Lesser Slave Lake appears to be good *S. discolor*. As yet no flowering material is available.

Salix Scouleriana Barr. — Moist soil on hillside, Dease L., B. C., *Mrs. Henry*, no. 954 (A, P); sandy loam, on drift soil, Spirit River, Alta., *Groh*, no. 981 (E, A); virgin poplar-spruce forest, Widewater, Lesser Slave L., *Moss*, no. 6076 (UA, G).

BETULACEAE

Betula papyrifera Marsh. var. **neoalaskana** (Sarg.) Raup. — Tetsa R., B. C., alt. 3800', *Mrs. Henry*, no. 887 (A, P). — Previously reported in our region only in the eastern part.

MORACEAE

Cannabis sativa L. — Farmyard, Spirit River, Alta., *Groh*, no. 972 (E, G).

URTICACEAE

Urtica urens L. — Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E); and no. 646 (E, G). — Noted by Groh as observed only at Beaverlodge, and not occurring abundantly.

LORANTHACEAE

Arceuthobium americanum Nutt. — Although no specimens are available, this species is probably common throughout the region. Groh noted it on *Pinus contorta* var. *latifolia* at Dawson Creek, and Brinkman reported it in the Lesser Slave L. district.

POLYGONACEAE

Rumex Acetosella L. — Reported by Groh at Beaverlodge, Alta., and in the Athabaska district.

Rumex mexicanus Meisn. — Sandy shore near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6268 (UA, G). — Reported by Groh as rather widely distributed in the agricultural districts, "growing in waste places, damp meadows and on slough margins."

Polygonum achoreum Blake. — Garden, at Grande Prairie, Alta., *Groh*, no. 889 (E, G).

Polygonum scabrum Moench. — *P. tomentosum* (Schränk.) Bickn. — See *Rhod.* 23: 259 (1921). — Slough and stream banks, Grande Prairie, Alta., *Groh*, nos. 876, 912 (E, G); lake shore at Grouard, Alta., *Groh*, no. 1066 (E, G).

Polygonum Douglasii Greene. — Edge of field, Beaverlodge, Alta., *Groh*, no. 849 (E, G). — John Macoun's record of *P. tenue* between Lesser Slave L. and Hudson Hope in 1872 may belong here.

Polygonum coccineum Muhl. — Sand dunes at lake shore, near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6255 (UA, G). — These specimens represent the terrestrial form of the species (forma *terrestre* (Willd.) Stanford).

Polygonum Convolvulus L. — Along railway, Peace River, Alta., *Moss*, no. 6104 (UA). — Reported by Groh as a common weed throughout most of the agricultural districts. Also noted by Graham in the Peace River Block, B. C., and earlier by John Macoun between Lesser Slave L. and Hudson Hope.

Fagopyrum esculentum Moench. — Noted by Groh as "sparingly persisting after cultivation."

CHENOPODIACEAE

Chenopodium capitatum (L.) Asch. — Garden, Beaverlodge, Alta., *Groh*, no. 647 (E, G); Hudson Hope, B. C., *R. J. Ferguson*, Aug. 29, 1939 (E). — Not previously collected in the Peace River district east of the mountains, but reported by Groh as common throughout, especially as a weed in new clearings.

Chenopodium glaucum L. — Recently seeded roadside, Griffin Creek, S. of Brownvale, Alta., *Groh*, no. 1014 (E); moist ground, Beaverlodge, Alta., *Groh*, no. 847 (E); garden, Beaverlodge, Alta., *Groh*, no. 645 (E, G); denuded bench of river valley, Peace River, Alta., *Moss*, no. 6136 (UA). — Reported by John Macoun in 1872 between Lesser Slave L. and Hudson Hope, and in 1875 at saline springs along the Peace River above the Smoky.

Chenopodium rubrum L. — Reported by Groh in saline places at Peace River, Alta.

Atriplex patula L. var. **hastata** (L.) Gray. — Roadside, Grande Prairie, Alta., *Groh*, no. 910 (E, G). — Groh states that both the species and the variety are "occasionally seen in waste places, particularly under saline conditions."

Atriplex hortensis L. — Escape from garden, Peace River, Alta., *Groh*, Sept. 12, 1934 (E).

Monolepis Nuttalliana (Schultes) Greene. — Dooryard, North Pine, *Groh*, Sept. 6, 1934 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); railway yard, Peace River, Alta., *Groh*, no. 1027 (E). — Noted by Groh as "occasional in somewhat alkaline spots, and at times a crop weed right across the belt."

Axyris amaranthoides L. — Cultivated fields, Peace River, Alta., *J. Bostock*, Aug. 1926 (E); neglected garden, Peace River, Alta., *Moss*, no. 6110 (UA); railway, Hines' Creek, Alta., *Groh*, no. 1000 (E, G). — Groh states that this species has become a common weed of waste land and roadsides throughout the agricultural districts.

Salicornia europaea L. — Alkaline slough, Salt Prairie, Alta., *Groh*, no. 1072 (E, G). — John Macoun's records for *S. herbacea* between Lesser Slave L. and Hudson Hope in 1872, and at saline springs along the Peace R. above the Smoky in 1875 undoubtedly belong here.

Suaeda depressa (Pursh) Wats. — Alkali slough, Bear L., near Grande Prairie, Alta., *Groh*, no. 893 (E, G); ditch, Spirit River, Alta., *Groh*, no. 935 (E, G); alkali slough, Salt Prairie, Alta., *Groh*, no. 1070 (E, G); alkali spot in railway yards, Spirit River, Alta., *Groh*, no. 964 (E, G). — John Macoun's record for *S. maritima* in 1872 between Lesser Slave L. and Hudson Hope probably belongs here.

Salsola Kali L. var. **tenuifolia** G. F. W. Mey. — Pouce Coupé, B. C., *Groh*, Sept. 1, 1934 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); railway yard, Peace River, Alta., *Groh*, no. 1028 (E); railway, Hythe, Alta., *Groh*, no. 857 (E); railway, Ryecroft, Alta., *Groh*, no. 984 (E, G). — Found chiefly in the very light soils of railways. Groh thinks that "in the North [it] may spread but little away from railway gravel and some light waste land."

AMARANTHACEAE

Amaranthus graecizans L. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); cultivated ground, Spirit River, Alta., *Groh*, no. 970 (E, G); railway, Watino, Alta., *Groh*, no. 988 (E, G).

Amaranthus retroflexus L. — Garden, Peace River, Alta., *Groh*, Sept. 12, 1934 (E); railway, Ryecroft, Alta., *Groh*, no. 982 (E); cultivated ground, Spirit River, Alta., *Groh*, no. 971 (E, G); railway, Watino, Alta., *Groh*, no. 987 (E).

CARYOPHYLLACEAE

Stellaria calycantha (Ledeb.) Bong. — Material cited under *S. borealis* in the *Catalogue* should bear this name. See Hultén, *Fl. Aleut. Isl.* 164: 5 (1937); and Fernald, *Rhod.* 42: 254-9 (1940).

STELLARIA CRISPA C. & S. — Reported by Graham in the Peace River Block, B. C.

Stellaria media (L.) Cyrill. — Reported by Groh as a rather common weed in the

agricultural districts, and noted by John Macoun in 1872 between Lesser Slave L. and Hudson Hope.

Cerastium vulgatum L. — Widewater, Alta., *Groh*, Sept. 17, 1934 (E). This specimen is only a rosette with runners, and is somewhat doubtfully determined. This species is reported by *Groh* as a weed also at Peace River, Alta., and in the Athabaska district.

Arenaria dawsonensis Britton. — Moist rocky débris along a creek near Tuchodi L., B. C., *Mrs. Henry*, no. 822 (G, P).

Silene repens Patrin. — Dry clay and limestone rocks, mountain near Tuchodi L., B. C., alt. 6000', *Mrs. Henry*, no. 842 (G, P); stony peat in grass, Mt. of the Gods, Prophet R., B. C., alt. 5500', *Mrs. Henry*, no. 775 (G, P); dry sandy clay and peat, mountain near Besa R., B. C., alt. 5000', *Mrs. Henry*, no. 760 (G, P).

Silene latifolia (Mill.) Britten & Rendle. — Reported by *Groh* as a weed at Beaverlodge, Alta.

Lychnis alba Mill. — Athabaska, Alta., *Groh*, July 3, 1935 (E); roadside, Widewater, Alta., *Moss*, no. 6075 (UA, G). — *Groh* reports it as a weed in the Athabaska district.

Lychnis Drummondii Wats. — Roadside at Taylor, B. C., *Groh*, no. 829 (E, G); prairie on dry valley slope, Peace River, Alta., *Moss*, no. 6101 (UA, G). — Reported by John Macoun in 1872 between Lesser Slave L. and Hudson Hope.

CERATOPHYLLACEAE

Ceratophyllum demersum L. — In small lake surrounded by muskeg, Smith, Alta., *Moss*, no. 6299 (UA).

RANUNCULACEAE

Anemone canadensis L. — Ft. Vermilion, Alta., *F. S. Lawrence*, 1907 (E); Rye-croft, Alta., *Mrs. Henry*, no. 373 (P); low ground, High Prairie, Alta., *Groh*, no. 1059 (E); under willows and poplars near a slough, Slave Lake, Alta., *Moss*, no. 6067 (UA, G). — Previously reported by Brinkman in the Lesser Slave L. district, and by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Ranunculus trichophyllus Chaix var. **typicus** Drew. — See *Rhod.* 38: 1–47 (1936). — Specimens cited in the *Catalogue* under *R. aquatilis* var. *capillaceus* belong here, as well as specimens collected by *Groh* (nos. 947, 956, E) in 1939 at Beaverlodge, Alta.

Ranunculus Gmelini DC. var. **Purshii** (Richards.) Hara. — Specimens cited in the *Catalogue* under *R. Purshii* should bear this name. See *Rhod.* 41: 385–6 (1939).

Ranunculus hyperboreus Rottb. — Damp moss at edge of Blue L., B. C., *Mrs. Henry*, no. 796 (G, P).

Ranunculus pennsylvanicus L. — Slough, Grande Prairie, Alta., *Groh*, no. 878 (E); Widewater, Alta., near shore of Lesser Slave L., *Moss*, no. 2228 (UA); open place in aspen woods, Faust, Lesser Slave L., *Moss*, no. 6211 (UA, G).

Ranunculus acris L. — Railway yards, Grande Prairie, Alta., *Groh*, no. 867 (E, G). — *Groh* reports this species as a weed of increasing importance, but thus far found mostly near railway lines.

CAPPARIDACEAE

Cleome serrulata Pursh. — Railway, Hythe, Alta., *Groh*, no. 856 (E, G). — *Groh* reports only a single colony near a grain elevator at Hythe, and states that it is probably an introduction.

CRUCIFERAE

Draba nivalis Liljebl. — Specimens collected on a mountain near Bluebell Mt., B. C., alt. 6500', *Mrs. Henry*, no. 541 (P), are somewhat doubtfully determined thus.

Draba luteola Greene. — Near Graham R., B. C., alt. 3000', *Mrs. Henry*, no. 463 (P); Charlie L., B. C., *Cowan*, June 11, 1938, no. 10821 (B).

Draba glabella Pursh. — Stony peat, Caribou Ridge, B. C., alt. 6300', *Mrs. Henry*, no. 768 (G, P); stony slide, mountain E. of Laurier Pass, B. C., alt. 5500', *Mrs. Henry*, no. 714(?) (G, P); Caribou Pass, B. C., alt. 5000', *Mrs. Henry*, no. 599(?) (P); moun-

tain near Bluebell Mt., B. C., alt. 6500', *Mrs. Henry*, no. 542(?) (P); hilltop in Laurier Pass, B. C., *Mrs. Henry*, no. 505(?) (P). — Several of these specimens are incomplete or without maturing siliques, making their determination uncertain.

Draba McCallae Rydb. — Near Graham R., B. C., alt. 3200', *Mrs. Henry*, nos. 468, 469 (P).

Draba lanceolata Royle. — Graham R., B. C., alt. 3400', *Mrs. Henry*, no. 467 (P); mountain side near Boulder Cr., B. C., alt. 4500', *Mrs. Henry*, no. 482 (P); dry, sunny meadow, middle fork of Nelson R., B. C., alt. 3900', *Mrs. Henry*, no. 740 (G, P); Saskatoon Mt., near Beaverlodge, Alta., *Groh*, no. 1216 (G). — A record of *D. cana* by Graham in the Peace River Block, B. C., may belong here.

Draba nemorosa L. var. ***lejocarpa*** Lindbl. — See *Rhod.* 36: 366 (1934). — Railway, High Prairie, Alta., *Groh*, no. 1061 (E, G); dry land, Beaverlodge, Alta., *Groh*, no. 686 (E, G); railway, McLennan, Alta., *Groh*, no. 1040 (E). — Specimens cited in the *Catalogue* under *D. nemorosa*, collected near Dawson Creek (*Raup & Abbe*, no. 3519), appear to represent the above variety.

Lesquerella arctica (Wormsk.) Wats. — See *Rhod.* 35: 267-70 (1933). — Dry rocky débris, mountain near Tuchodi L., B. C., alt. 6000', *Mrs. Henry*, no. 848 (P).

Thlaspi arvense L. — Waste ground, Beaverlodge, Alta., *Groh*, no. 848 (E). — Reported by *Groh* as a common and obnoxious weed throughout the agricultural districts.

Lepidium sativum L. — Roadside recently seeded to grass, Griffin Creek, S. of Brownvale, Alta., *Groh*, no. 1013 (E, G).

Cardaria Draba (L.) Desv. var. ***repens*** (Schrenk.) O. E. Schulz. — *Lepidium Draba* L. — See *Rhod.* 42: 302-6 (1940). — Waste places, Grand Prairie, Alta., *M. Davies*, Aug. 1929 (E); Tepee Creek, Alta., *Jack Head*, Aug. 1928 (E); Pouce Coupé, B. C., *Sgt. Greenwood*, Aug. 1932 (B); six mi. E. of Grande Prairie, Alta., *Groh*, no. 906 (E, G). See also *Groh* in *Can. Field Nat.* 55: 55 (1941) for further notes on the history of this plant and the next in Canada.

Cardaria pubescens (Meyer) Rollins var. ***elongata*** Rollins. — See *Rhod.* 42: 302-6 (1940). — Six mi. E. of Grande Prairie, Alta., *Groh*, no. 907 (E); yards and fields, Rolla, B. C., *Groh*, nos. 835, 836 (E); field, Grimshaw, Alta., *Groh*, no. 1016 (E, G).

Camellina sativa (L.) Crantz. — Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); roadside, Taylor, B. C., *Groh*, no. 827 (G); Kleskun Lake bottom, E. of Grande Prairie, Alta., *Groh*, no. 900 (E, G). — Reported (with *C. microcarpa*) as common throughout most of the agricultural districts.

Camellina microcarpa Andr. — Athabaska, Alta., *Groh*, July 3, 1935 (E); Hythe, Alta., *Groh*, Aug. 31, 1934 (E); Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E) and Oct. 9, 1929 (E); Barrhead, Alta., *Groh*, June 27, 1935 (E).

Neslia paniculata (L.) Desf. — Reported by *Groh* as common and widespread in the agricultural districts — "One of the chief mustards in all the grain-growing parts." Also noted by Graham in the Peace River Block, B. C.

Erucastrum gallicum (Willd.) Schulz. — Brownvale, Alta., *Groh*, Sept. 13, 1934 (E); Greencourt, Alta., *Groh*, no. 1083 (E, G), Calahoo, Alta., *Groh*, no. 1080 (E, G); Rochfort Bridge, Alta., *Groh*, no. 1081 (E, G); McLennan, Alta., *Groh*, no. 1053 (E). — Mainly along railways.

Brassica Kaber (DC.) Wheeler var. ***pinnatifida*** (Stokes) Wheeler. — *Brassica arvensis* (L.) Ktze. — See *Rhod.* 40: 306-9 (1938). — Girouxville, Alta., *Groh*, no. 991 (E, G); McLennan, Alta., *Groh*, no. 1043 (E); Hines Creek, Alta., *Groh*, no. 996 (E); Spirit River, Alta., *Groh*, no. 643 (E).

Brassica campestris L. — Railway, Grande Prairie, Alta., *Groh*, no. 874 (E). — Also reported by *Groh* at Athabaska.

Conringia orientalis (L.) Dumort. — Hythe, Alta., *Groh*, Aug. 31, 1934 (E). — *Groh* states that this has been "Five times recorded from end to end of the belt."

Sisymbrium altissimum L. — Roadside near Taylor, B. C., *Moss*, no. 2372 (UA). — Reported by *Groh* as widespread and common throughout the agricultural districts, "but chiefly yet as a weed of railways and waste places."

Descurainia Sophia (L.) Wats. — Waste places, Halcourt, Alta., *Groh*, Oct. 11, 1929 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 and Aug. 29, 1934 (E); Hythe, Alta., *Groh*, Aug. 31, 1934 (E); Ft. St. John, B. C., *Groh*, Sept. 7, 1934; railway, Hines Creek, Alta., *Groh*, no. 997 (E, G). — *Groh* reports this species (under *Sisymbrium Sophia*) as a common and widespread weed.

Descurainia Richardsonii (Sweet) O. E. Schulz. — Ft. St. John, B. C., *Groh*, Sept. 7, 1934 (E); railway yards, Brownvale, Alta., *Groh*, no. 1001 (E, G); railway and roadsides, Beaverlodge, Alta., *Groh*, nos. 884 (E, G), 862 (E); waste places, High Prairie, Alta., *Groh*, no. 1076 (E, G); railway yards, Berwyn, Alta., *Groh*, no. 1019 (E); sandy lake shore, Canyon Creek, Lesser Slave L., *Moss*, no. 6246 (UA, G). — *Groh*'s records of *Sisymbrium Hartwegianum* ("at Fort St. John and occasionally throughout") should be referred to this species. His specimens from Hudson Hope, B. C., no. 816 (E), are doubtfully placed here. *Descurainia Richardsonii* is in the *Catalogue*, but had been collected only on the Halfway River, B. C.

Braya purpurascens (R. Br.) Bunge. — Specimens somewhat doubtfully so determined were collected by *Mrs. Henry* on a mountain near Caribou Pass, B. C., alt. 6500', no. 611 (P); on a mountain near the source of Akie R., B. C., alt. 5500', no. 570 (P); and on the Nelson R., B. C., alt. 4200', no. 523 (P).

Braya Richardsonii Fern. — Graham R., B. C., alt. 4000', *Mrs. Henry*, no. 501 (P).

Hesperis matronalis L. — Reported by *Groh* only at Athabaska, Alta.

Erysimum cheiranthoides L. — Open ground, Bear Flat, Peace R., B. C., *Phyllis Freer*, July 12, 1935 (B); railway, Grande Prairie, Alta., *Groh*, no. 864 (E, G). — Previously reported in 1872 between Lesser Slave L. and Hudson Hope by John Macoun, and at McLeod L. in 1879 by G. M. Dawson. *Groh* considers this species, so far as its character as a weed is concerned, "One of the worst of the native mustards." He reports it throughout the agricultural district.

Rorippa islandica (Oeder) Borbás var. **microcarpa** (Regel) Fern. — Material cited in the *Catalogue* under *R. palustris* var. *glabrata* should bear the above name. See *Rhod.* 42: 25-32, 267-74 (1940).

Rorippa islandica (Oeder) Borbás var. **hispida** (Desv.) Butters & Abbe. — *R. palustre* var. *hispida* of auth. — See *Rhod.* 42: 25-32 (1940). — Lesser Slave L. district, *Brinkman*, no. 4563 (N, Br); sandy beach, Canyon Creek, Lesser Slave L., *Moss*, no. 6280 (UA, G). — The *Brinkman* number was cited in the *Catalogue*, incorrectly, under *R. palustris* var. *glabrata*.

Armoracia lapathifolia Gilib. — *Radicula Armoracia* of auth. — Reported by *Groh* as an escape at Fairview, Alta.

Barbarea orthoceras Ledeb. — Tupper Cr., B. C., *Cowan*, July 5, 1938, no. 10847 (B). — Previously reported in the upper Peace R. region only in the mountains.

CARDAMINE OLIGOSPERMA Nutt. — Reported by *Graham* in the Peace River Block, B. C. Probably referable to *C. pennsylvanica*.

Arabis lyrata L. var. **kamchatica** Fisch. — See *Rhod.* 39: 88-98 (1937). — Fallow field, Brownvale, Alta., *Groh*, no. 1012 (E). — All of the material cited in the *Catalogue* under *A. lyrata* var. *occidentalis* (*Raup & Abbe*, nos. 3797, 4096, 4153, 4267) should be placed here.

Arabis hirsuta (L.) Scop. var. **pynocarpa** (Hopkins) Rollins. — See *Rhod.* 39: 112-22 (1937) and 43: 318 (1941). — Dawson Creek, B. C., *Groh*, Sept. 1, 1934 (E); Ft. St. John, B. C., *Groh*, Sept. 4, 1934 (E). Specimens cited in the *Catalogue* under *A. hirsuta* (*Raup & Abbe* nos. 3638, 3581) have been referred to var. *pynocarpa* by Rollins.

Arabis Holboellii Hornem. — Dr. R. C. Rollins, who has recently monographed *Arabis* in western America, has referred part of the material cited in the *Catalogue* under *A. retrofracta* to the above species: Damp turfy ledge on W. slope of Mt. Selwyn, alt. 4-5000', *Raup & Abbe*, no. 3958. The remainder is referred to the following variety. See *Rhod.* 43: 439-45 (1941).

Arabis Holboellii Hornem. var. **retrofracta** (Grah.) Rydb. — Dry slope of River Bluff at Taylor Flat, *Raup & Abbe*, no. 3573.

Arabis divaricarpa A. Nels. — Railway yard, Brownvale, Alta., *Groh*, no. 1004 (E, G); Lesser Slave L. district, *Brinkman*, no. 4338.

SAXIFRAGACEAE

Tellima grandiflora Dougl. — Previously reported on the Misinchinca R., B. C., by Dawson in 1879, and collected by Graham in the Peace River Block, B. C., no. 396 (BU).

Parnassia palustris L. var. **neogaea** Fern. — See *Rhod.* **39**: 311 (1937). — Near Saskatoon Mt., Beaverlodge, Alta., *Groh*, no. 706 (E); border of slough, Slave Lake, Alta., *Moss*, no. 6068 (UA, G). — A specimen cited in the *Catalogue* under *P. multiseta* should be referred to this species. Previously reported only in the mountains.

Parnassia parviflora DC. — Moist bank, Hudson Hope, B. C., *Groh*, no. 753 (E, G); Tupper Cr., B. C., *Cowan*, June 6, 1938, no. 10893(?) (B). — Also reported by Graham in the Peace River Block, B. C.

Ribes hirtellum Michx. — See *Rhod.* **13**: 73-76 (1911). — Lesser Slave L. district, *Brinkman*, nos. 4167, 4277 (Br.).

ROSACEAE

Aruncus sylvester Kost. — Professor M. L. Fernald, who has recently discussed this group for America (*Rhod.* **38**: 179-82, 1936), maintains that western material usually cited under *A. acuminatus* cannot be separated from *A. sylvester* of Eurasia.

Sorbaria sorbifolia (L.) A. Br. — Roadside, Peace River, Alta., *Groh*, no. 1022 (E).

Sorbus scopulina Greene. — Saskatoon Mt., near Beaverlodge, Alta., *Moss*, no. 2304 (UA); virgin poplar spruce forest, Widewater, Lesser Slave L., *Moss*, no. 6078 (UA, G). — Material cited in the *Catalogue* under *S. dumosa* should be placed here. — See Jones in *Jour. Arn. Arb.* **20**: 1-43 (1939).

Crataegus columbiana Howell. — Hillside at Bear Flat, B. C., *P. Fraser*, June 14, 1935, no. 10169 (B). — John Macoun's records of *C. rivularis* at McLeod L., and of *C. Douglasii* at Hudson Hope in 1875 may have been based on this species.

Rubus parviflorus Nutt. forma **bifarius** (Fern.) Fassett. — Specimens cited in the *Catalogue* as typical *R. parviflorus* should have the above name, according to a recent treatment by Fassett in *Ann. Mo. Bot. Gard.* **27**: 299-374 (1941). See also Fernald in *Rhod.* **37**: 273-84 (1935). A specimen collected by Groh on Bear Mt., near Dawson Creek, B. C., Sept. 3, 1934 (E), should also be included.

Rubus pedatus Smith. — Mountain in Akie Pass, B. C., alt. 4500', *Mrs. Henry*, no. 589 (P). — Previously known in our region from a single specimen, collected at McLeod L., B. C., by John Macoun in 1875.

Rubus arcticus L. — Swale E. of Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E). — Not noted in the *Catalogue* east of the Rocky Mountains.

Potentilla norvegica L. var. **hirsuta** (Michx.) Lehm. — Noted in the *Catalogue* only near Rocky Mountain Portage, but according to Groh, common throughout the agricultural districts. Groh has collected it at Fahler, Beaverlodge, and Grande Prairie, Alta.

Potentilla millegrana Engelm. — Fahler, Alta., *Groh*, Sept. 4, 1934 (E); bank of stream, Grande Prairie, Alta., *Groh*, no. 918 (G); lake shore, Grouard, Alta., *Groh*, no. 1067 (E, G). — Noted by Groh as occurring particularly on burnt-over land.

Potentilla biflora Willd. — Peat over limestone, Mt. of the Gods, Prophet R., B. C., alt. 6500', *Mrs. Henry*, no. 774 (G, P); mountain near Gathto Cr., B. C., alt. 6300', *Mrs. Henry*, no. 813 (G, P).

Potentilla glabrella Rydb. — High Prairie, Alta., *Groh*, Sept. 15, 1934 (E); dry roadside, Hudson Hope, B. C., *Groh*, no. 730 (E); sandy tract, Hudson Hope, B. C., *Groh*, no. 767 (E, G).

Potentilla gracilis Dougl. subsp. **Nuttallii** (Lehm.) Keck. — See *Carn. Inst. Wash. Publ.* no. **520**: 134-6 (1940) for a recent treatment of the synonymy of this subspecies. — Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); swale E. of Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); edge of field, Beaverlodge, *Groh*, no. 850 (E); Dawson Creek,

B. C., *Cowan*, June 27, 1938, no. 10811 (B). — Graham's record of *P. Nuttallii* in the Peace River Block, B. C., may be referable here.

Potentilla Hippiana Lehm. — Dry hill, Cache Cr., B. C., *Mrs. Henry*, no. 679 (G, P).

Potentilla Anserina L. — Moist open ground, Bear L., Alta., *J. Bostock*, Aug., 1926 (E); sandy lake shore near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6264 (UA). — Not noted in the Catalogue east of the Rocky Mountains. Reported by Groh as "frequent in wet situations."

Chamaerhodos Nuttallii Pickering. — See Rhod. 37: 284-5 (1935). — Turnagain R., B. C., *Mrs. Henry*, nos. 940, 941 (G, P).

Geum aleppicum Jacq. var. **strictum** (Ait.) Fern. — *G. strictum* Ait. — See Rhod. 37: 293-4 (1935). — Material cited in the Catalogue under *G. strictum* should be referred here. Groh reports this species as rather common and wide-spread in the agricultural districts.

Agrimonia striata Michx. — High Prairie, Alta., *Groh*, Sept. 15, 1934 (E). — Also reported by Groh in the Athabaska district, Alta.

Sanguisorba sitchensis C. A. Meyer. — *S. canadensis* L. var. *latifolia* Hook. — See Hultén, Fl. Aleut. Isls. 232-3 (1937). — Dease R., B. C., *Mrs. Henry*, no. 964 (P). — Dawson's record of *Potterium canadense* on the Misinchinca R. in 1879 may be this species.

LEGUMINOSAE

Medicago sativa L. — Reported by Groh as an escape, especially in the western part of the agricultural district.

Medicago lupulina L. — Reported by Groh as a weed at Beaverlodge and Fahler, Alta.

Medicago falcata L. — Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E). — Reported by Groh as an occasional escape.

Melilotus alba Desf. — Reported by Groh as a common escape throughout most of the agricultural districts. It is more frequent than the next.

Melilotus officinalis Lam. — Reported by Groh as a common escape throughout most of the agricultural districts.

Trifolium repens L. — Reported by Groh as an escape, common to abundant throughout the agricultural districts.

Trifolium hybridum L. — Reported by Groh as an abundant escape throughout the agricultural districts. He states that "... the alsike clover evidently [is] better at home than the others, and the red clover least so."

Trifolium pratense L. — Reported by Groh as an escape throughout most of the region.

Caragana arborescens Lam. — Roadside ditch, seeded from nearby hedge, High Prairie, Alta., *Groh*, no. 1055 (E, G).

Astragalus canadensis L. — Woods, Bear Flat, B. C., *Groh*, no. 818 (E, G).

Astragalus lineare (Rydb.) A. E. Porsild. — See Rhod. 41: 250-51 (1939). — Lesser Slave L. district, *Brinkman*, no. 4073 (Br.).

Oxytropis retrorsa Fern. — See Rhod. 30: 140-41 (1928). — Grande Prairie, Alta., *Miss J. Bostock*, Aug. 1926 (E); railway, Hines Creek, Alta., *Groh*, no. 995 (E).

Oxytropis Paysoniana A. Nels. — Specimens cited in the Catalogue under *O. saximontana* A. Nels. (*Raup & Abbe*, nos. 3844, 3980) should be referred to this species.

Hedysarum alpinum L. var. **grandiflorum** Rollins. — See Rhod. 42: 217-39 (1940). — Specimens noted in the Catalogue under *H. alpinum* (*Raup & Abbe*, nos. 3967, 4091) should be referred to this variety.

Hedysarum boreale Nutt. — See Rhod. 42: 217-39 (1940). — Dry hills, Hudson Hope, B. C., *Groh*, no. 802 (E, G).

Vicia americana Muhl. var. **angustifolia** Nees. — Dry slope, Peace River, Alta., *Moss*, no. 6094 (UA, G).

Lathyrus ochroleucus Hook. — Dawson Creek, B. C., *Groh*, Sept. 3, 1934 (E); dry soil, Bear Flat, B. C., *Proctor*, May 30, 1935, no. 10197 (B); Beaverlodge district, Alta., *Stacey*, 1926; dry hills, Hudson Hope, B. C., *Groh*, no. 801 (E, G); aspen woods,

Brownvale, Alta., *Groh*, no. 1003 (E, G). — Reported by Groh as common and widespread. Noted in the *Catalogue* only as an unverified record by John Macoun between Lesser Slave L. and Hudson Hope.

GERANIACEAE

Geranium nemorale Suksd. var. **Bicknellii** (Britton) Fern. — See Rhod. 43: 35–6 (1941). — Specimens cited in the *Catalogue* under *G. Bicknellii* should all be referred here. Groh reports the species as widespread, especially in recently burned areas.

LINACEAE

Linum usitatissimum L. — Beaverlodge, *Groh*, Aug. 29, 1934 (E). — Reported by Groh as “Sparingly escaped in the Peace River parts particularly.”

POLYGALACEAE

Polygala Senega L. — Dry open meadow near railroad, Blue Sky, Alta., *Mrs. Henry*, no. 666 (G, P); Peace River Block, B. C., *J. Travis*, 1930 (B).

EUPHORBIACEAE

Euphorbia glyptosperma Engelm. — Railway yards, Berwyn, Alta., *Groh*, no. 1021 (E, G).

Euphorbia serpyllifolia Pers. — Railway gravel, Peace River, Alta., *Groh*, Sept. 12, 1934 (E).

CALLITRICHACEAE

Callitriche hermaphrodita L. — See Rhod. 25: 211 (1923), and Vierteljahrssch. Nat. Ges. Zür. 53⁴: 548 (1909). — Dease R., B. C., *Mrs. Henry*, no. 962 (P).

ACERACEAE

Acer Negundo L. — Groh states that it has been “seen a few times where introduced by planting, and tending to multiply.”

BALSAMINACEAE

Impatiens biflora Walt. — Specimens collected by Graham in the Peace River Block, B. C. (nos. 448, 509, BU) are probably referable to this species, although more well-collected specimens are needed before its correct status, as well as that of *I. Nolitangere*, can be defined. Brinkman reports *I. biflora* in the Lesser Slave L. district (no. 3920), but the writer has not seen his material.

MALVACEAE

Malva neglecta Wallr. — *M. rotundifolia* of Am. auth. — See Rhod. 39: 98–9 (1937). — Athabaska, Alta., *Groh*, July 3, 1935 (E). — Groh states that he has seen it only at Athabaska.

GUTTIFERAE

Hypericum majus (Gray) Britton. — Lake shore, Grouard, Alta., *Groh*, no. 1068 (E, G).

VIOLACEAE

Viola arvensis Murr. — Fields and gardens, Beaverlodge, Alta., *Groh*, Aug. 28, 29, 1934 (E); no. 687 (E, G). — Groh states that in a garden at Beaverlodge, “. . . a colony of plants exhibited every degree of variation between this and *V. tricolor* L., suggesting that the whole stock may have been derived from reversion of the garden pansy.”

CACTACEAE

Opuntia fragilis (Nutt.) Haw. — Specimens cited in the *Catalogue* under *O. polyantha* belong here.

ELAEAGNACEAE

Elaeagnus commutata Bernh. — Specimens cited in the *Catalogue* under *E. argentea* (Pursh, not Moench) should bear this name.

ONAGRACEAE

Epilobium densum Raf. — Wetter parts of muskeg, near lake, Smith, Alta., *Moss*, no. 6300 (UA, G); depression with willows and tall grass near Slave Lake, Alta., *Moss*, no. 6055 (UA, G).

Epilobium palustre L. var. **monticola** Haussk. — Muskeg, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6152 (UA). — Previously collected only in the mountains.

Oenothera strigosa (Rydb.) Mack. & Bush. — Railway, Grande Prairie, Alta., *Groh*, no. 865 (E, G). — *Groh* records "*Oenothera* sp." as fairly common in the Athabaska district and occasionally farther west. More collections will be necessary before it will be known whether more than one species are involved.

HALORRHAGACEAE

Myriophyllum exalbescens Fern. — *M. spicatum* of auth. — See *Rhod.* **21**: 120 (1919). — Slough W. of Turnagain R., B. C., alt. 2100', *Mrs. Henry*, no. 929 (G, P); Blue L., B. C., *Mrs. Henry*, no. 795 (P); near mouth of stream on sandy lake shore, Faust, Lesser Slave L., *Moss*, no. 6201 (UA). — Reported by Graham (as *M. spicatum*) in the Peace River Block, B. C.

UMBELLIFERAE

Cicuta occidentalis Greene. — Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E); alkaline slough, Bear L., near Grande Prairie, Alta., *Groh*, no. 898 (E); dried slough along Halfway R., near the Peace, at Farrell, B. C., *Groh*, no. 721 (E); wet runway in prairie, Notikewin, *Moss*, no. 6190 (UA, G). — John Macoun's record of *C. maculata* between Lesser Slave L. and Hudson Hope in 1872 probably refers to this species.

Cicuta bulbifera L. — Wet ground by railway, W. of McLennan, Alta., *Groh*, Sept. 14, 1934 (E). — *Groh* mentions only this one locality.

Carum Carui L. — Railway, McLennan, Alta., *Groh*, no. 1038 (E). — *Groh* reports it as rather widespread in the agricultural districts, but not common.

Zizia aptera (Gray) Fern. — *Z. cordata* of auth. — See *Rhod.* **41**: 441-4 (1939). — Specimens noted in the *Catalogue* under *Z. cordata* should be referred here; also specimens collected by *Groh* at Brownvale, Alta. (no. 1002, E) and Rolla, B. C. (no. 834, E, G); and by *J. Travis* in the Peace River Block, B. C., 1930 (B).

THASPIUM AUREUM Nutt. — Reported by Graham in the Peace River Block, B. C.

Lomatium foeniculaceum (Nutt.) Coult. & Rose. — See *Ann. Mo. Bot. Gard.* **25**: 259-60 (1938). — Dry sunny bank of Peace R., Fort St. John, B. C., *Mrs. Henry*, no. 671 (G, P); hillside at Bear Flat, Peace R., B. C., *M. Proctor*, May 19, 1935, no. 10177 (B).

Anethum graveolens L. — *Groh* states that this was "found on dry slope at Peace River, Alta., apparently an escape from cultivation."

OENANTHE SARMENTOSA Presl. — Reported by Graham in the Peace River Block, B. C.

Pastinaca sativa L. — *Groh* states that this species is naturalized mostly in the western half of the agricultural region.

CORNACEAE

Cornus stolonifera Michx. var. **Baileyi** (Coult. & Evans) Drescher. — This was erroneously indicated in the *Catalogue* as a new combination. See *Trans. Mich. Acad. Sci. Arts & Letters* **28**: 190 (1933).

PYROLACEAE

Pyrola secunda L. — Sandy tract at Hudson Hope, B. C., *Groh*, no. 784 (E); dry pine woods, Peace River, Alta., *Moss*, no. 6125 (UA). — Noted in the *Catalogue* only from the mountains.

Pyrola asarifolia Michx. — Poplar woods, Hudson Hope, B. C., *Groh*, no. 804 (E, G); dry pine woods, Peace River, Alta., *Moss*, no. 6124 (UA, G). — This typical form of the species noted in the *Catalogue* only from the mountains.

Monotropa uniflora L. — Aspen-poplar woods, Faust, Lesser Slave L., *Moss*, no. 6217 (UA).

ERICACEAE

Ledum palustre L. var. **decumbens** Ait. — Mountain near Laurier Pass, B. C., alt. 4400', *Mrs. Henry*, no. 511 (P).

Arctostaphylos Uva-ursi (L.) Spreng. — Dry stony soil, Ft. St. John, B. C., *Mrs. Henry*, no. 677 (G, P); dry hills, Hudson Hope, B. C., *Groh*, no. 805 (E, G); railway embankment, McLennan, Alta., *Groh*, no. 1039 (E). — Noted in *Catalogue* only on reports of Macoun and Raup. Common.

Vaccinium uliginosum L. — When the *Catalogue* was prepared this species was known in our region from a single specimen collected by Dawson on the Frances R. The following material collected by *Mrs. Henry* is therefore worthy of note: S. E. slope of mountain near Akie Pass, B. C., alt. 5000', no. 579 (P); Akie Pass, B. C., alt. 4600', no. 560 (P); clay bank, E. of Gunderhoo Pass, B. C., alt. 4700', no. 903 (G, P); Dease L., B. C., alt. 2500', no. 956 (G, P).

PRIMULACEAE

Primula egaliksensis Wormsk. f. **violacea** Fern. — See *Rhod.* **30**: 59 (1928). — In moss near stream, Caribou Pass, B. C., alt. 5500', *Mrs. Henry*, no. 738 (G, P).

GENTIANACEAE

Halenia deflexa (Smith) Griseb. — Noted in the *Catalogue* from a single collection on the Henry R., B. C. (*Mrs. Henry*, no. 174). Brinkman reports a specimen (no. 4004) from the Lesser Slave L. district, but it has not been seen by the writer.

POLEMONIACEAE

Polemonium occidentale Greene. — Low ground, Notikewin, Alta., *Moss*, no. 2244 (UA); swampy ground at roadside, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6146 (UA, G).

Polemonium lanatum Pall. var. **humile** (Willd.) Brand. — A specimen collected by *Mrs. Henry* at Cypress Pass, B. C., alt. 4000', no. 700 (G, P) is probably referable to this species.

Polemonium rotatum Eastwood. — Mountain near Laurier Pass, B. C., alt. 5400', *Mrs. Henry*, no. 645 (P); Laurier Pass, B. C., alt. 4600', *Mrs. Henry*, no. 648 (P). — Both of these specimens are placed in this species tentatively. Dr. E. T. Wherry states (personal communication) that a habit photograph made by *Mrs. Henry* and attached to one of the above sheets shows rotate-campanulate corollas, and so does not agree entirely with the original description of *P. rotatum*.

HYDROPHYLLACEAE

Phacelia tanacetifolia Benth. — Montney, B. C., *Groh*, Sept. 5, 1934 (E). — Also reported by *Groh* at Baldonnel, B. C., and both regarded as garden escapes.

BORAGINACEAE

Lappula echinata Gil. — Peace River district, B. C., *Miss Bertrand*, 1933, no. 9422 (B); Peace River, Alta., *Groh*, Sept. 12, 1934 (E); railway, Spirit River, Alta., *Groh*, no. 943 (E). — Reported by *Groh* as a rather common weed along railways and in fields throughout most of the agricultural districts.

Hackelia deflexa (L.) Opiz. — Dry roadside, Hudson Hope, B. C., *Groh*, no. 810 (E, G); open woods, Taylor Flat, B. C., *Groh*, no. 830 (E).

LABIATAE

Agastache Foeniculum (Pursh) Ktze. — Moist fields, Peace River, Alta., *Miss J. Bostock*, Aug. 1926 (E); roadside, Peace River, Alta., *Groh*, no. 1023 (E, G). — Noted in the *Catalogue* on reports by John Macoun between Lesser Slave L. and Hudson Hope in 1872, and by Dawson at Dunvegan in 1879.

Stachys palustris L. subsp. **pilosa** (Nutt.) Epling. — See *Fedde Rep. Spec. Nov. Beihefte* **80**: 63 (1934). — Material cited in the *Catalogue* under *S. scopulorum* should bear this name.

SOLANACEAE

Solanum nigrum L. — Reported by Groh in gardens and fields at Beaverlodge, Alta., and Taylor, B. C., Sept. 1934.

Solanum triflorum Nutt. — Field, at Taylor, B. C., *Groh*, no. 824 (E). — Also reported by Groh at Taylor in 1934, "in fields with crops."

SCROPHULARIACEAE

Linaria vulgaris Hill. — Clyde, Alta., *Groh*, July 4, 1935 (E); railway yards, Berwyn, Alta., *Groh*, no. 1020 (E).

Linaria minor (L.) Desf. — Railway, Rochefort Bridge, Alta., *Groh*, no. 1082 (E, G).

Linaria reticulata Desf. — Escaped from gardens at Fort St. John, B. C., *Groh*, Sept. 7, 1934 (E), and at Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E). — This is the *L. macroccana* of Groh's list.

Penstemon procerus Dougl. — Edge of field, Beaverlodge, Alta., *Groh*, no. 851 (G); Peace River Block, B. C., *Graham*, no. 136 (BU) (*P. confertus* var. *caeruleo-purpureus* of Graham's list). — Noted in the *Catalogue* only from specimens collected on the upper Halfway R.

Penstemon Gormanii Greene. — Turnagain R., B. C., *Mrs. Henry*, no. 938 (G, P); Sand Cr., B. C., *Mrs. Henry*, nos. 953, 971, 972 (G, P).

Limosella aquatica L. — Stream bank, Grande Prairie, Alta., *Groh*, no. 916 (E).

Veronica alpina L. var. *unalaschcensis* Cham. & Schl. — Specimens collected by E. C. Abbe and the writer on Mt. Selwyn, and probably the others cited in the *Catalogue* under *V. Wormskjoldii* should bear this name. — See Fernald in *Rhod.* **41**: 447–57 (1939) for a recent revision of the group.

VERONICA ANAGALLIS-AQUATICA L. — Reported by Graham in the Peace River Block, B. C.

Veronica persica Poir. — *V. Tournefortii* of auth. — See *Acad. Nat. Sci. Phila. Monog. I*: 349 (1935). — Garden at Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E).

Castilleja fulva Pennell. — See *Proc. Acad. Nat. Sci. Phila.* **86**: 540 (1934). — The following specimens, cited in the *Catalogue*, should be referred to this species: *Mrs. Henry*, nos. 230, 231; *Raup & Abbe*, nos. 3602, 3944. No. 3602 is the type of the species. Further specimens, not cited in the *Catalogue*, are: Christine Falls, Graham R., B. C., alt. 3000', *Mrs. Henry*, no. 465 (P); Graham R., B. C., alt. 4000', *Mrs. Henry*, nos. 496, 502 (P).

Castilleja Henryi Pennell. — See *Proc. Acad. Nat. Sci. Phila.* **86**: 534–5 (1934). — Mountain at head of Besa R., B. C., alt. 5500', *Mrs. Henry*, no. 303 (P, G) (cited in *Catalogue*); mountain E. of Laurier Pass, B. C., alt. 5500', *Mrs. Henry*, no. 709 (G, P). No. 303 is the type of this species.

Castilleja Raupii Pennell subsp. *typica* Pennell. — See *Proc. Acad. Nat. Sci. Phil.* **86**: 528–30 (1934). — White Mud R., Alta., *J. M. Macoun*, no. 61256 (G, N, O); Toad R., B. C., alt. 4200', *Mrs. Henry*, no. 120 (P); N. of Grimshaw, Alta., *Moss*, no. 2242a (P); Notikewin, Alta., *Moss*, no. 2242b (P); muskeg, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6144 (UA, G).

Euphrasia subarctica Raup. — Musqua R., B. C., *Mrs. Henry*, no. 790 (G, P).

Rhinanthus Kyrollae Chab. — Wet meadow, Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); Bear Flat, B. C., *Freer*, July 31, 1935, no. 10133 (B); open woods, Notikewin, *Moss*, no. 2257 (UA); dry ground, roadside, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6148 (UA, G); Peace River Block, B. C., *Graham*, no. 572 (BU) (*R. Crista-galli* of Graham's list). — Noted by Groh as rather common in the western parts of the agricultural district. John Macoun's record of *R. minor* between Lesser Slave L. and Hudson Hope in 1872 may belong here.

Pedicularis labradorica Wirsing, not Houttuyn. — See *Rhod.* **40**: 292 (1938). — Note change of authority.

Pedicularis Langsdorfii Fisch. — Mountain in Caribou Pass, B. C., alt. 6500', *Mrs. Henry*, no. 615 (P).

PLANTAGINACEAE

Plantago major L. — Dry roadsides, Hudson Hope, B. C., *Groh*, nos. 729 (E), 733 (E, G); railway yards, Beaverlodge, Alta., *Groh*, no. 663 (E, G). — Many or all of Groh's records for *P. major* var. *asiatica* are probably referable to the typical species. He reports the variety as abundant and widespread as a weed throughout the agricultural districts.

Plantago lanceolata L. — Barnyard at Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E). — Also reported by Groh at North Pine.

RUBIACEAE

Galium aparine L. — Athabaska, Alta., *Groh*, July 3, 1935 (E).

CAPRIFOLIACEAE

Viburnum edule (Michx.) Raf. — Material cited in the *Catalogue* as *V. pauciflorum* Raf. should bear this name. See Fernald in *Rhod.* **43**: 481-3 (1941).

Symphoricarpos albus (L.) Blake. — In a recent monograph (*Jour. Arn. Arb.* **21**: 201-52, 1940) Jones has not maintained the var. *pauciflorus* under which the Peace River plants were cited in the *Catalogue*. It is noteworthy that the writer has recently seen a specimen collected at Bear Flat, B. C., by Percy Freer (June 18, 1935, no. 10140 (B)) which closely matches the typical species as represented in the Gray Herbarium.

Lonicera involucrata Banks. — Noted in the *Catalogue* only from the mountains, but reported by Brinkman (no. 3912) in the Lesser Slave L. district. The writer has not seen this material, but he has collected the species at Lac la Biche to the eastward.

Lonicera notha Zab. (*L. Ruprechtiana* × *L. tartarica*). — Garden escape in dry ground, Hudson Hope, B. C., *Groh*, no. 813 (A, E).

CUCURBITACEAE

Echinocystis lobata T. & G. — Reported by Groh at Peace River, High Prairie, and in the Athabaska district, Alta.

CAMPANULACEAE

Campanula aurita Greene. — Specimens cited in the *Catalogue* under *C. rotundifolia* var. *alaskana* should be referred to this species. Another specimen was collected by Mrs. Henry in 1935: stony slide on a mountainside near St. Paul's Mt., B. C., alt. 6500', no. 897 (part) (P).

COMPOSITAE

Grindelia perennis A. Nels. — See *Ann. Mo. Bot. Gard.* **21**: 485 (1934). — Material cited in the *Catalogue* under *G. squarrosa* belongs here, as well as specimens collected by Groh at Beaverlodge, Alta., no. 665 (E, G). Noted by Groh as rather widespread throughout the agricultural districts.

Solidago decumbens Greene var. **oreophila** (Rydb.) Fern. — See *Rhod.* **38**: 202-4 (1936). — Following Prof. M. L. Fernald's recent revision of this group, at least a part of the material cited in the *Catalogue* under *S. decumbens* (*Raup & Abbe*, nos. 3858, 4251) should be placed here. Likewise, the specimens cited under *S. oreophila* (*Brinkman*, no. 4511; *Mrs. Henry*, no. 84).

Aster angustus (Lindl.) T. & G. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); railway, Hines Creek, Alta., *Groh*, no. 998 (E); railway, McClennan, Alta., *Groh*, no. 992 (E, G).

Aster sibiricus L. — Material cited in the *Catalogue* under *A. Richardsonii* should bear this name. See Porsild, *Rhod.* **41**: 291; Scamman, *Rhod.* **42**: 339; Hultén, *Fl. Kamtch.* **4**: 157-8, and *Fl. Aleut. Isl.* 317-18.

Erigeron angulosus Gaudin var. **kamtschaticus** (DC.) Hara. — *E. elongatus* Ledeb. — See *Rhod.* **40**: 346 (1938) and **41**: 388-390 (1939). — Material cited in the *Catalogue* under *E. acris* var. *asteriodes* should bear the above name.

Erigeron elatus Greene. — See *Rhod.* **40**: 344-47 (1938). — Specimens cited in the *Catalogue* under *E. acris* var. *arcuans* belong here.

Erigeron jucundus Greene. — Material cited in the *Catalogue* under *E. acris* L. var. *debilis* should bear this name.

Erigeron caespitosus Nutt. — Two of Mrs. Henry's numbers (143, 181), cited in the *Catalogue* under *E. glabellus*, should be referred to this species.

Erigeron canadensis L. — Noted by Groh as common and widespread in the agricultural districts, "on cultivated and pasture fields on the lighter type of soil."

Antennaria atriceps Fern. — Previously known only from the type locality on Mt. Selwyn (*Raup & Abbe*, no. 4134). Excellent additional material was collected by Mrs. Henry on a mountain E. of Laurier Pass, B. C., alt. 5800', no. 715 (G, P).

Antennaria aprica Greene. — Material cited in the *Catalogue* under *A. parvifolia* Nutt. should be referred to this species. Additional specimens were collected by Mrs. Henry in 1935, extending the known range westward into the foothills: Cache Cr., B. C., no. 680 (G, P); S. fork of Halfway R., B. C., alt. 4200', no. 727 (G, P).

Iva axillaris Pursh. — Alkaline soil, Bear L., near Grande Prairie, Alta., *Groh*, no. 892 (E, G); dry field, Lower Beaverlodge, Alta., *Groh*, no. 841 (E, G); roadside north of Kleskun Lake bottom, near Grande Prairie, Alta., *Groh*, no. 901 (E, G).

Iva xanthifolia Nutt. — Dry land, Beaverlodge, Alta., *Groh*, no. 683 (E); railway, McLennan, Alta., *Groh*, no. 990 (E, G); railway, Wanham, Alta., *Groh*, no. 985 (E, G).

Ambrosia artemisiifolia L. — McLennan, Alta., *Groh*, Sept. 14, 1934 (E).

Ambrosia trifida L. — Railway yards, Spirit River, Alta., *Groh*, no. 925 (E, G). — Occasional in the agricultural districts, according to Groh, as far west as Pouce Coupé, B. C.

Helianthus annuus L. — Hythe, Alta., *Groh*, Aug. 31, 1934 (E); Pouce Coupé, B. C., *Groh*, Sept. 1, 1934 (E).

Helianthus giganteus L. — Railway yards, Spirit River, Alta., *Groh*, nos. 927 (E), 928 (E, G); roadside, High Prairie, Alta., *Moss*, no. 2404 (UA).

Madia glomerata Hook. — Ditch along railway, McLennan, Alta., *Groh*, no. 1052 (E, G).

Gaillardia aristata Pursh. — Athabaska, Alta., *Groh*, July 3, 1935 (E); railway yards, Berwyn, Alta., *Groh*, no. 1017 (E).

Anthemis Cotula DC. — Yard at Hudson Hope, B. C., *Groh*, no. 814 (E, G); railway yards, Spirit River, Alta., *Groh*, no. 926 (G).

Anthemis tinctoria L. — Garden escape, McLennan, Alta., *Groh*, Sept. 13, 1934 (E).

Achillea Ptarmica L. — Roadside ditch, escape from planting, High Prairie, Alta., *Groh*, no. 1060 (E, G).

Matricaria matricarioides (Less.) Porter. — Included in the *Catalogue* on the basis of an early record (1875) by John Macoun at Hudson Hope. Groh lists it as abundant and widespread throughout the agricultural districts, and Graham also notes it in the Peace River Block.

Matricaria maritima L. var. *agrestis* (Knaf.) Wilmott. — *M. inodora* of auth. — Groh states that this species has been "Seven times noticed from McLennan westward to the Peace River Block."

Chrysanthemum Leucanthemum L. var. *pinnatifidum* Lecoq & Lamotte. — Hythe, Alta., *Groh*, Aug. 31, 1934 (E); railway at Greencourt, Alta., *Groh*, no. 1084 (E). — Brinkman's record of *C. Leucanthemum* (no. 4649) in the Lesser Slave L. district probably belongs here.

Artemisia dracunculoides Pursh. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E), and nos. 1033, 1034 (E); dry slope of river valley, Peace River, Alta., *Moss*, no. 6087 (UA, G); Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E); railway yards, Beaverlodge, Alta., *Groh*, no. 664 (E, G). — Noted by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Artemisia caudata Michx. — Roadsides and railways, Spirit River, Alta., *Groh*, nos. 939, 961 (E, G).

Artemisia borealis Pall. — See *Rhod.* 29: 93-5 (1927). — Moist sandy river bar,

Musqua R., B. C., *Mrs. Henry*, no. 785 (G, P). — This species was represented in the *Catalogue* only by its variety *Purshii* Bess.

Artemisia Absinthium L. — Roadside, Grande Prairie, Alta., *Groh*, no. 911 (E, G). — Apparently occasional in the agricultural districts. Reported by Brinkman (no. 3875) in the Lesser Slave L. district.

Artemisia biennis Willd. — Swale E. of Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); Peace River, Alta., *Miss Bostock*, Aug. 1926 (E). — Noted by Groh as abundant and widespread throughout the agricultural districts. Reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Artemisia arctica Less. — Material cited in the *Catalogue* as *A. norvegica* should be referred to this species. See Hultén, *Fl. Kamtchatka* 4: 176–80 (1930) for a discussion of *A. arctica* and its relationships.

Artemisia ludoviciana Nutt. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); dry bank, Grande Prairie, Alta., *Groh*, no. 872 (E, G). — Reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872. Groh notes it as common throughout most of the agricultural districts.

Artemisia Abrotanum L. — Dry bank, Grande Prairie, Alta., *Groh*, no. 873 (E).

Arnica obtusifolia Less. var. **acuta** Raup. — Previously known only from the type collection in a pass N.E. of Robb L., B. C. (*Mrs. Henry*, no. 279). Additional material was collected by *Mrs. Henry* in 1935, on a mountain near Besa R., B. C., no. 751-a (G, P); and in 1933 on a mountain near the Akie R., B. C., alt. 5000', no. 580 (P).

Senecio vulgaris L. — Garden at Grande Prairie, Alta., *Groh*, no. 888 (E, G). — Noted by Groh as "occasional from the Grande Prairie district eastward."

Senecio palustris (L.) Hook. — Lake shore, McLennan, Alta., *Groh*, no. 1045 (E, G).

SENECIO PURSHIANUS Nutt. — Reported by Brinkman in the Lesser Slave L. district (no. 4085).

Cirsium Drummondii T. & G. — Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E); dry poplar woods, Hudson Hope, B. C., *Groh*, no. 737 (E, G); prairie, Notikewin, Alta., *Moss*, no. 6165 (UA, G). — Noted in the *Catalogue* only from the mountains. It is reported by Groh as occurring chiefly in the western part of the agricultural district.

Cirsium arvense (L.) Scop. — By railway elevator, Huallan, Alta., *Groh*, no. 863 (E); yard, Spirit River, Alta., *Groh*, no. 924 (E). — Groh states that this species is now widely distributed in the agricultural districts, though but recently introduced.

Crepis tectorum L. — Clyde, Alta., *Groh*, July 4, 1935 (E); railway, Spirit River, Alta., *Groh*, no. 967 (E); railway, Beaverlodge, Alta., *Groh*, no. 882 (E); roadside, Hudson Hope, B. C., *Groh*, no. 815 (E, G).

CREPIS VIRENS L. — Reported by Graham in the Peace River Block, B. C.

Taraxacum officinale Weber. — White soil of parkland, South Wapiti, Alta., *Groh*, no. 689 (E). — Reported by Groh as common and widespread in the agricultural districts. Mr. Groh also states that a "fair proportion" of the common dandelions of the region belong to *T. laevigatum*; but in the absence of specimens, especially since *T. laevigatum* as recently interpreted by Prof. Fernald is a somewhat more southern species (*Rhod.* 35: 379–80), these records had best be left tentative.

Lactuca biennis (Moench) Fern. — *L. spicata* of auth. — See *Rhod.* 42: 300–302 (1940). — Lesser Slave L. district, *Brinkman*, nos. 4036, 4479 (Br).

Lactuca scariola L. f. **integrifolia** (Bogenh.) G. Beck. — Peace River, Alta., *Groh*, Sept. 13, 1934 (E); denuded bench of river valley, Peace River, Alta., *Moss*, no. 6137 (UA, G); roadside, Spirit River, Alta., *Groh*, no. 940 (E, G). — Plants cited by Groh under *L. scariola* belong to this form.

Prenanthes racemosa Michx. — Pouce Coupé, B. C., *Sgt. Greenwood*, Aug. 1932, no. 9223 (B); prairie at North Star, near Notikewin, Alta., *Moss*, no. 2274 (UA); prairie, Notikewin, *Moss*, no. 6163 (UA, G); burned poplar area, Hythe, Alta., *Moss*, no. 2326 (UA).

Sonchus arvensis L. — Fahler, Alta., *Groh*, Sept. 14, 1934 (E); roadside, Grouard, Alta., *Groh*, no. 1063 (E). — Apparently occasional in our region, and principally represented, according to Groh, by the following variety.

Sonchus arvensis L. var. **glabrescens** Guenth., Wimm. & Grab. — See Rhod. **12**: 145 (1910); **30**: 19 (1928). — Railway yards, Spirit River, Alta., *Groh*, no. 930 (E); railway, Grande Prairie, Alta., *Groh*, no. 866 (E). — Groh states that this variety is rather common and widespread in the agricultural districts.

Sonchus asper (L.) Hill. — Baldonnel, B. C., *Groh*, Sept. 5, 1934 (E). — Noted by Groh "in the Athabaska, Peace River and Fort St. John regions."

Sonchus oleraceus L. — Garden, at Beaverlodge, Alta., *Groh*, no. 837 (E). — Reported by Groh from this single locality.

Tragopogon major Jacq. — Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E); railway, Wembley, Alta., *Groh*, no. 885 (E). — At least a part of the plants cited by Groh from Beaverlodge under *T. pratensis* belong to this species.

Tragopogon pratensis L. — Railway yards, Dawson Creek, B. C., *Groh*, no. 832 (E, G). — Previously reported by *Brinkman* (no. 4084) in the Lesser Slave L. district.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

ON CERTAIN EUPHORBIACEAE FROM THE TROPICAL FAR EAST

LEON CROIZAT

IN the present paper new species and combinations are included together with new records and general critical notes pertaining to representatives of the following genera: *Actephila* Bl., *Phyllanthus* L., *Securinega* A. L. Juss., *Dicoelia* Benth., *Cleistanthus* Hook. f., *Croton* L., *Alchornea* Sw., *Macaranga* Thouars, *Epiprinus* Griff. and *Trigonostemon* Bl.

As a result of the study of the limits of certain controversial groups the following changes are introduced: (1) *Ptychopyxis* Miq. is made to include *Calpigyne* Bl. and *Podadenia* Thw.; (2) *Phyllanthodendron* Hemsl., treated as a section of *Phyllanthus* by many authors, is reestablished as of generic rank; (3) *Coelodepas* Hassk. is used as a *nomen genericum conservandum* and its range is extended to China and Indo-China; (4) *Paracleisthus* Gagnep. and *Nephrostylus* Gagnep. are reduced to *Cleistanthus* and *Coelodepas* respectively; (5) *Symphyllia* Baill. is reduced to *Epiprinus* Griff.; (6) *Phyllanthus* L. sect. *Eriococcus* Muell.-Arg. is raised to subgeneric rank. Various new species are proposed and new combinations made in the genera mentioned. This study is based on material in the herbarium of the Arnold Arboretum of Harvard University.

Actephila Blume

Actephila longipedicellata (Merr.) comb. nov.

Cleistanthus longipedicellatus Merr. Univ. Calif. Publ. Bot. **10**: 425. 1924.

Apparently a good species, endemic to W. Tonkin, belonging to *Actephila*, having the long-pedicelled and porrected ♀ flowers of numerous species of this genus. Its foliage strongly suggests that of *Erismanthus* Wall., with which it may easily be confused whenever sterile. *Actephila excelsa* Muell. Arg., from India, has much stouter pedicels in fruit. *Actephila subsessilis* Gagnep. has differently shaped leaves and different perianths.

Actephila Merrilliana Chun, Sunyatsenia **3**: 26. 1935.

Actephila inopinata Croiz. Jour. Arnold Arb. **21**: 490. 1940, Syn. nov.

The original description was based on cultivated specimens originating in Hainan but grown in Canton. When publishing my new species, I relied upon Chun's description and illustration, not realizing that numerous collections of *A. Merrilliana* had been erroneously determined and filed as representative of *Dimorphocalyx Poilanei* Gagnep. These collections, all from Hainan, are as follows: *Lau* 276, 1118, *Chun & Tso* 44524, *Liang* 62134, *How* 70707, 70916, 73826, *Wang* 33012, 34919. *Actephila* and *Dimorphocalyx*, although totally unrelated, are easily confused in a sight-determination, as they differ chiefly in floral characters.

The original description of *A. Merrilliana* Chun stresses the puberulent young shoots and branchlets. The material now available shows that the pubescence is sparse and not very persistent in plants grown under natural conditions. Thus the form which I have called *A. inopinata* may require trinomial recognition in a final revision of the group, although for the present it is placed as a straight synonym of Chun's species.

***Actephila dolichantha* sp. nov.**

Frutex vel arbuscula ad 2 m. altus, cortice pallido, innovationibus ut adest glabratus. Foliis 10–4 cm. longis, 3–1 cm. latis, discoloribus, supra olivaceis, subtus pallide brunneis, oblanceolatis, chartaceis, integerrimis, apice brevius acuminatis, basi longissime cuneatis, venis obscuris, utrinque ca. 8-jugis, adscendentibus; petiolo ca. 1 cm. longo, stipulis petiolaribus triangularibus coriaceis ad 2 mm. longis. Pedunculo fructifero subcapilliformi ad 5 cm. longo, hinc inde bracteolato, pedicello proprio ex articulatione suprema pedunculi 1 cm. longo clavato. Columella crassiuscula 4 mm. longa; coccis delapsis ad 2 cm. longis, endocarpio coriaceo-lignoso, exocarpio tenui, leviusculo, toto secedibili; semine submaturo figura grosse pentagono, 10 mm. lato, 8 mm. longo, facie ventrali impresso incurvo, raphe conspicuo.

CHINA: Yunnan, Kuen-ger, Che-li Hsien, C. W. Wang 79253, October 1936, in mixed forest at 1000 m. alt.

The available material is poor, but the seed is that of an *Actephila*. The Indian *A. excelsa* Muell. Arg. is a very different plant, with much shorter and stouter fruiting pedicels; *A. subsessilis* Gagnep. and *A. longipedicellata* Croiz. have a very different foliage. This is apparently the first record of *Actephila* for continental China.

***Phyllanthus* Linnaeus**

***Phyllanthus Petelotii* sp. nov.**

Arbuscula vel frutex glaberrimus, lignosus. Foliis 1.5–1 cm. longis, 0.5–0.2 cm. latis, lanceolato-ellipticis vel ellipticis, firme chartaceis, margine vix revolutis, venis subobscuris adscendentibus ad 6-jugis; petiolulo brevissimo vix 0.75 mm. longo, stipulis late trigonis, infra interdum liberi, interdum apice setaceis, margine erosulis ad 2 mm. longis latisque. Floribus ♂ ignotis. Floribus ♀: pedicello rigido capillaceo ad 1 cm. longo; perianthii lobis 5 ad basem liberis, integerrimis, lineari-lanceolatis, secus medium costato-venosis, 1.25 mm. longis, 0.30 mm. latis. Ovario glaberrimo, sulcato, levissimo, vix 0.30 mm. magno; stylo erecto ca. 3 mm. longo, stigmatibus lentis ad 1 mm. partitis, subulatis, disco grosse glanduloso.

INDO-CHINA: Tonkin, Cascade d'Argent, Massif du Tam Dao, Pételot 5226, May 1931.

The foliage and the long-pedicelled flowers suggest *P. simplex* Retz., but this is a widely distributed annual or perennant weed, having a different floral structure. *Phyllanthus parvifolius* Buch.-Ham., which I am unable at present to extricate from *P. Roeperianus* Muell.-Arg., is probably near *P. Petelotii* as to true affinities, but it has different flowers and smaller leaves. The best diagnostic character of the new species is apparently the structure of the pistillate flower, the erect styles and somewhat effuse habit of the stigmas suggesting *P. flexuosus* Sieb. & Zucc. (*Glochidion flexuosum* Pax & Hoffm.) and species of *Securinega*.

Phyllanthus sinicus (Baill.) Muell. Arg. *Linnaea* **32**: 50. 1863.

Cicca sinica Baill. *Etud. Gén. Euphorb.* 618. *pl.* 24, *figs.* 28–33. 1858.

Phyllanthus nobilis a *genuinus* Muell. Arg. in DC. *Prodr.* **15**(2): 414. 1866, p.p.

As Hooker suspected (*Fl. Brit. Ind.* **5**: 305. 1887), Mueller's understanding of the species of this group is unsatisfactory. *Tsang 29583*, collected at the Taai Wong Mo Shan in Kwangtung, answers the characters of Baillon's *Cicca sinica* and is certainly different from *P. nobilis*, which is a plant from tropical America. *Ford 166*, cited by Forbes & Hemsley (*Jour. Linn. Soc. Bot.* **26**: 420. 1894) as "*Sauropus* ?", probably belongs here and seems to be the same as *Ford 144*, determined "*Sauropus* ?" in the Paris Herbarium. Hooker separates *P. indicus* Muell. Arg. from *P. cyanospermus* Muell. Arg. because the latter has larger flowers and fruits and seeds of a brilliant metallic blue. I fail to find a real difference between *Stocks, Law & C.* (Malabar and Concan, *P. indicus*) and *Thwaites 2155* (Ceylon, *P. cyanospermus*), the ripe seed measuring in both about 5 mm. *Tsang 29583*, on the other hand, has a seed fully 7 mm. long. This difference, coupled with less manifest characters in the perianth, suggests that the plant of China is not conspecific with that of India.

The authors who have dealt with *Cicca* L. either as a section or as a genus are quite unable to agree on its limits. Mueller Argoviensis (DC. *Prodr.* **15**(2): 413–418. 1866) and Pax & Hoffmann (*Engl. & Prantl Nat. Pflanzenfam.* 2nd edit. **19**(c): 62. 1931) treat as *Phyllanthus* sect. *Cicca* species which Gamble (*Fl. Pres. Madras* **2**: 1293. 1925) recognizes under *Prosorius* Dalz. Robinson uses *Cicca* (*Phil. Jour. Sc. Bot.* **4**: 87. 1909) for the sake of one species, *C. acida* (L.) Merr., which has a woody fruit with abortive cells, but rejects Kurz's (*For. Fl. Burma* **2**: 352. 1877) concept of the genus. These doubts and controversies show that the scope of *Cicca* and similar oligotypic or monotypic segregates from *Phyllanthus* is yet to be tested by a study that critically considers all the species of this vast genus.

Phyllanthus discofractus sp. nov.

Frutex videtur, apicibus pube crispula minuta sordide vel laete brunnea dissite indutis. Foliis 8–4.5 cm. longis, 3–1.5 cm. latis, habitu optime distichis, ellipticis vel triangulari-ellipticis, interdum subfalcatis, basi late rotundatis, tenuiter chartaceis, colore vario, adultioribus supra griseis, tenellis brunneo-vinosis, hinc inde subtus pube levi parcius adpersis vel glabratis, venis late patentibus utrinque ca. 6-jugis, tenuibus; petiolo vix 0.2–0.3 cm. longo, puberulo, stipulis petiolaribus late triangularibus, acutatis, integris ad 0.15 cm. longis. Floribus in cymulis axillaribus hermaphroditis congestis. Perianthio ♂ colore vinoso ad 0.4 cm. lato, optime 4-lobo, lobis 0.2 cm. longis, margine erosis; staminibus 4 subsessilibus; pedicello gracillimo capilliformi, habitu lento vel flexuoso, ad 0.5 mm. longo. Perianthio ♀: colore ♂, ad 0.7 cm. lato, lobis 6 in serie duplici alternantibus, triangulari-ovatis, ad 0.35 cm. longis, 0.15 cm. latis, margine fimbriato-erosis, medio costatis; ovario primo intuitu eximie 6-gono, levi, glabro, ad 0.15 cm. magno, subdepresso, disco ad 0.25 cm. magno, urceolato, labio interno ad basem ovarii videtur aucto, margine subintegro vel repandulo, in partes 3 irregulares (quoad viso) lacerato-partito; stylis 6 applanatis,

habitu cornutis, apice haud involutis, vix 0.1 cm. longis; pedicello subclavato ad 1.1–1.5 cm. longo.

INDO-CHINA: Sai Wong Mo Shan (Sai Vong Mo Leng), a short distance south of the Kwangtung border, *Tsang* 30366, May-Dec., 1940.

The new species belongs to *Phyllanthus* subg. *Eriococcus* (Hassk.) Croiz. & Metc. (*Phyllanthus* sect. *Eriococcus* (Hassk.) Muell.-Arg. *Linnaea* **32**: 3. 1863). This subdivision has been treated as a genus by Baillon under *Eriococcus* Hassk., 1843 (*Etud. Gén. Euphorb.* 648. 1858) and by Gamble (*Fl. Pres. Madras* **2**: 1291–1293. 1925) under the later name, *Reidia* Wight, 1852. A strong case can be made for Baillon's and Gamble's interpretations, because the species of this affinity form a closely knit natural group and do not range beyond Asia and Australasia. Clearly, *Eriococcus* is worthy of at least subgeneric rank and in a general revision of *Phyllanthus* it probably will have to be treated as a genus.

Phyllanthus discofractus differs from *P. Roxburghii* Muell.-Arg. in its large ♂ flower with differently shaped lobes; from *P. elegans* Muell.-Arg. in its much less robust habit and the smaller size of all its parts; from *P. gomphocarpus* Hook. f. in its disc and lobes of the perianth; from *P. asteranthos* Croiz., *P. rubriflorus* Beille, and *P. Bodinieri* Rehd. in the foliage. *Phyllanthus ruber* (Lour.) Spreng. superficially resembles the new species but does not even belong in the same subdivision.

Securinega A. L. de Jussieu

Securinega Spirei (Gagnep.) comb. nov.

Flueggea Spirei Gagnep. in Lecomte, *Fl. Gén. Indo-Chine* **5**: 529, figs. 65, 66. 1927.

I have not seen authentic material and rely on the description and illustrations of Gagnepain for the new combination. As stated in a previous contribution (*Jour. Arnold Arb.* **21**: 491. 1940), I agree with Pax & Hoffmann in reducing *Flueggea* to *Securinega*. The entire alliance to which this genus belongs is in need of critical attention.

Phyllanthodendron Hemsley

The floral differences that separate *Phyllanthodendron* from *Phyllanthus* are at least as great as those which separate the latter genus from *Sauropus* Bl., *Andrachne* L., *Breynia* J. R. & G. Forst., *Securinega* A. L. de Juss., *Glochidion* J. R. & G. Forst., *Reverchonia* A. Gray and *Agyneia* L. Considering that the original description was carefully drawn up by Hemsley, with the support of excellent illustrations (*Hook. Ic.* **26**: pl. 2563–2564. 1898), we can understand only with difficulty why *Phyllanthodendron* came to be merged with *Phyllanthus* as a "section" even by authors who at first recognized it as a distinct genus, *Uranthera* (Pax & Hoffmann, *Pflanzenr.* **47** (iv. 147. iii): 95. 1911). Mueller-Argovienensis, in describing *Phyllanthus mirabilis*, the basynym of *Phyllanthodendron mirabile*, noticed (*DC. Prodr.* **15**(2): 356. 1866) that it was a "Species forma calycis valde peculiaris et glandulis subpetaloideis insignita, nulli congenerum similis."

The characters that separate *Phyllanthodendron* generically from *Phyllanthus* are: (1) the slender ligules that alternate with the calyx lobes;

(2) the absence of a true disc or glands in the flowers of both sexes; (3) the peculiarly elongate and nearly saccate lobes which Pax & Hoffmann in their description of *Uranthera* aptly characterize as "Sepala cochleato-concava . . . parte superiore in acumen lineare, patens exeuntia."; (4) the usually thick and undivided grooved styles; (5) the intangibles of flower, inflorescence and vegetative characters which have prompted various botanists to identify specimens of *Phyllanthodendron* as representing *Cleistanthus* or even *Glochidion*. A further character which probably has generic importance and requires a modification of the definition of the ovule's and seed's position in the Euphorbiaceae is found strongly marked in *Phyllanthodendron anthopotamicum* (Hand.-Mazz.) Croiz. In this species the chalaza is located on the face of the seed and at the side, not on an adaxial line perpendicular to the hilum. This arrangement is radically different from anything so far observed in the family. A structure of the same kind has probably also been seen by Craib & Hutchinson, who describe (Kew Bull. 279. 1910) the seeds of *P. album* as follows: "Semina irregulariter subtriquetra, dorso convexa, in utroque latere excavatione alternatim supra et infra auriformi." The "excavations" are the hilum and the chalaza, if I am not very much mistaken, for these organs in the seed of *P. anthopotamicum* are embedded in a grooved line somewhat resembling an: "excavatione alternatim supra et infra auriformi."

It is not easy to determine the position of *Phyllanthodendron* in the Engler & Prantl classification as elucidated by Pax & Hoffmann. Characters appear in this genus that bespeak affinities with *Actephila* and *Cleistanthus*, but these two genera are separated in that classification in a clean cut manner, which disregards the fact that *Savia* is very near *Cleistanthus*. There is not the slightest reason, moreover, why *Andrachne phyllanthoides* should be placed in *Savia* as *S. phyllanthoides* Pax & Hoffm. *Phyllanthodendron* probably links the *Glochidion* group with the *Cleistanthus* aggregate.

The material in our herbarium, although fairly representative, is not of the best, so that a key to the species based on it, while it might be plausible on paper, would in practice be of little value. There are three main groups which may be characterized under the following sections:

(1) **Phyllanthodendron** sect. **Euphyllanthodendron**, sect. nov.

Floribus minusculis, lobis perianthii longe acuminatis, in cymulis axillari-bus congestis, pedicellis brevibus vel subnullis.

Typus: *Phyllanthodendron ligulatum* (Beille) Croiz.

The clusters of young flowers can easily be confused with fascicles of bud-stipules, as shown, although not very clearly, by Beille (Lecomte, Fl. Gén. Indo-Chine 5: 595. fig. 72, 5. 1927).

(2) **Phyllanthodendron** sect. **Pseudoactephila**, sect. nov.

Floribus pro genere majusculis, lobis modice acuminato-cochleatis, pedicellis vulgo praesertim sub fructu bene elongatis.

Typus: *Phyllanthodendron roseum* Craib & Hutchinson.

The inflorescence, especially when in fruit, suggests *Actephila*, but the foliage is reminiscent of *Cleistanthus* or *Glochidion*.

(3) **Phyllanthodendron** sect. **Calophyllum**, sect. nov.

Foliis minoribus vix ultra 5 cm. longis, indumento proprio facile distinguitur, caeterum inter sectiones praevias medium tenet.

Typus: *Phyllanthodendron anthopotamicum* (Hand.-Mazz.) Croiz.

These three sections may be keyed as follows:

- Leaves less than 6 cm. long Sect. *Calophyllum*
 Leaves more than 6 cm. long
 Flowers minute, not over 1-1.5 mm. wide, crowded in short-pedicelled capitulate inflorescences Sect. *Euphyllanthodendron*
 Flowers large, 2 or more mm. wide, crowded in long-pedicelled capitulate inflorescences Sect. *Pseudoactephila*

The specific epithets under *Phyllanthodendron* have been treated as masculine or neuter. Since *Phyllanthodendron* is a modern compound, formed from two Greek words, I treat it as neuter from the gender of its last component.

(1) Sect. **Euphyllanthodendron**

Phyllanthodendron mirabile (Muell. Arg.) Hemsley, Hook. Ic. **26**: pls. 256.3-256.4, 1898.

Phyllanthus mirabilis Muell.-Arg. Flora **47**: 513. 1864 et in DC. Prodr. **15**(2): 355. 1866; Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 589. 1927; Pax & Hoffm. in Engl. & Prantl Nat. Pflanzenfam. ed. 2. **19**(c): 63. 1931.

I place this species in *Euphyllanthodendron* from the description and the illustration. It may prove to be near *P. ligulatum*.

Phyllanthodendron ligulatum (Beille) comb. nov.

Phyllanthus ligulatus Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 592. 1927.

The spelling of the epithet *lingulatus* is an evident orthographic error which must be corrected to *ligulatus*. This species is well represented in our herbarium, and in addition I have examined all the material preserved in the herbarium of the Paris Museum. The leaf is fairly symmetric, sometimes slightly auriculate at the base, rather large (up to 15 cm. long and 4 cm. wide), with comparatively few veins (about 7 pairs in a large leaf), apparently subcoriaceous in life. It is a robust woody climber, and its edaphic preference is to the rich soil of decomposed basalt in the primitive forest. The range in Indo-China is prevailing southern and strictly tropical, in Cochinchina, Cambodia and Laos. Beille extends this species to Tonkin, and publishes a variety, var. *tonkinensis* (op. cit. 593). The holotype of this variety, *Balansa* 3290, of which a fragment is available here, belongs to *Phyllanthodendron Poilanei* (Beille) Croiz., not to *P. ligulatum*. It is almost certain that the *Bon* collections cited by Beille from Tonkin also belong to *P. Poilanei*. It is worthy of note that *Balansa* 3290 is listed by Gage under *P. coriaceum*, which is almost certainly an error, but indicates that similar plants range as far south as Perak.

Phyllanthodendron Poilanei (Beille) comb. nov.

Phyllanthus Poilanei Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 593. 1927.

Phyllanthus lingulatus Beille var. *tonkinensis* Beille l.c.

This species is very near *P. ligulatum*, but is distinct from it on account of its smaller leaves and slightly different flowers. Its range is northern in comparison with that of *P. ligulatum*. An unrecorded collection is *Poilane*

16382: Annam, Vinh Province, Mount Len Câ, 350 m. alt. The collector reports that this plant, unlike *P. ligulatum*, prefers calcareous shallow soil, being a vine that reaches a length of about 10 feet.

Phyllanthodendron coriaceum Gage, Rec. Bot. Surv. India **9**: 219. 1922; Ridley, Fl. Malay Pen. **3**: 205. 1924.

I have seen no material representing this species, but the description and the citation of *Balansa* 3290 (almost certainly an error) indicate that Gage had before him a plant not unlike *P. ligulatum*. The specific epithet was by error printed *dubium*, but in the index to the volume this was replaced by *coriaceum*, and in later distributions of the publication the correction is stamped p. 219. The new binomial was overlooked by the compilers of the current supplement to Index Kewensis.

(2) Sect. **Pseudoactephila**

Phyllanthodendron roseum Craib & Hutchinson, Kew Bull. **1910**: 23. (Febr.) 1910.

Phyllanthodendron album Craib & Hutchinson, op. cit. 279. (Oct.) 1910.

Phyllanthodendron roseum var. *siamensis* Craib, Kew Bull. **1911**: 460. 1911.

Phyllanthodendron siamense Hosseus, Repert. Sp. Nov. **10**: 116. 1912.

Uranthera siamensis Pax & Hoffm. Pflanzenr. **47** (iv. 147. iii): 95. 1911.

Phyllanthus roseus Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 590. 1927.

Phyllanthus albus Beille in Lecomte, l.c.

Phyllanthus roseus var. *glabrum* Beille, l.c.

Phyllanthus roseus Pax & Hoffm. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, **19**(c): 63. 1931.

Phyllanthus albus Pax & Hoffm. l.c.

Pax & Hoffmann, in making the transfers of *Phyllanthodendron album* and *P. roseum* to *Phyllanthus*, were antedated four years by Beille. Pax, however, was the first author to reduce *Phyllanthodendron* to *Phyllanthus* (Engl. & Prantl, Nat. Pflanzenfam. Ergänzungsh. **1** (Nachtr. 3): 37. 1900), but *Uranthera siamensis*, as noticed by Craib and by Hosseus within one year from its publication, is *Phyllanthodendron*.

A fragment of *Kerr* 521, the type collection of *P. album*, is available in our herbarium. Craib & Hutchinson believe that this species can be distinguished from *P. roseum* by its "foliis lanceolatis, stipulis basi haud productis." I cannot follow them in using these differences as specific characters in this group. The holotypes of *P. album* and *P. roseum* were collected at the same locality (Doi Sotep, near Chiangmai, Siam) and almost at the same altitude (720–800 m.). On the basis of the descriptions I believe that only one species is involved. The variable pubescence of the ovary, which Craib and Hosseus use as a varietal (or as a specific) character, does not impress me as being important enough to deserve consideration, especially for the segregation of distinct species.

So far as the fragment of *Kerr* 521 indicates, *P. album* is altogether glabrous on the branchlets and bears but a reduced hispid pubescence on the abaxial side of the petioles. A very poor Chinese specimen in our herbarium might belong here: *Wang* 76122, Yunnan: Fo-Hai, in woods, 1200 m., July 1936.

Phyllanthodendron dubium (Ridley) Gage, Rec. Bot. Surv. India **9**: 219. 1922;
Ridley, Fl. Malay Pen. **3**: 205. 1924.

Cleistanthus dubius Ridley, Jour. As. Soc. Straits Branch **59**: 168. 1911.

Glochidion flavum Ridley, op. cit. **59**: 173. 1911.

A *Curtis* collection from Langkawi, probably the same one cited by Ridley, is in our herbarium. The material suggests *P. album*, but the leaves are longer and more cuneate. I merely follow Gage in the reduction of *Cleistanthus dubius* and *G. flavum*, having seen no specimens.

Phyllanthodendron carinatum (Beille) comb. nov.

Phyllanthus carinatus Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 591. 1927.

A poor fragment of the holotype, *Eberhardt* 2572, is in our herbarium. I believe that the species falls into Sect. *Pseudoactephila*, but this needs to be verified. A leaf about 8 cm. long has but 2–3 pairs of ascending veins that manifestly anastomose at about 8 mm. from the margin. The growth is altogether glabrous, as shown in the specimen, with the exception of few hispid hairs on the abaxial side of the very young leaves.

Phyllanthodendron yunnanense sp. nov.

Arbuscula, 7 m. alta. Ramulis apice costulatis, pube pallide brunnea vel albicante brevi indutis, aetate glabratis, cortice cinereo plus minusve rimoso. Foliis 8–6 cm. longis, 3.5–2 cm. latis, brunneis, firme chartaceis, plerumque inaequilateris, more *Glochidionis* specierum subfalcatis, caeterum ellipticis, venis patule adscendentibus utrinque 8–10-jugis, apice brevius acuminatis, margine hinc inde sub lente acri denticulato-erosis, vix revolutis, nervo medio conspicuo; petiolo brevissimo 2–5 mm. longo, pubescente, stipulis petiolaribus apice acuminato-setaceis, basi rotundatis, pubescentibus, diutius persistentibus vel marcescentibus. Floribus utriusque sexus in glomerulis axillaribus congestis, pedicellis basi hirtellis subcapilliformibus ad 4 cm. longis. Flore ♂: perianthio 5 mm. lato, disco nullo, lobis calycinis 5–(6), ca. 2 mm. longis, centro valde costatis caeterum more generis subhyalinis, apice acutatis, plus minusve calloso-mucronatis, glandulis seu ligulis calycinis tenuissimis, subuliformibus, cum lobis alternatibus iisque brevioribus; filamentis staminum in columnam coalitis ad 2 mm. longa, antheris didymis ca. 1 mm. longis, connectivo apice eximie producto subulato, pistillodio nullo. Flore ♀: perianthio ♂ sed majore, lobis ad 6 mm. longis, 1.5 mm. latis, ligulis calycinis 3–5 mm. longis, linearibus; ovario globuloso 2.5 mm. magno, parcius setuloso, disco omnino nullo, stylis patentibus, carnosulis, apice integris, sulcatis.

CHINA: Y u n n a n: Meng-Ka, C. W. Wang 72901, alt. 1670 m., April 1936.

Apparently of the affinity of *P. album*, but altogether different in its foliage.

Phyllanthodendron lativenium sp. nov.

Arbuscula videtur, ramulis apice subherbaceis in sicco nigris, glabris vel glabratis. Foliis 11–6 cm. longis, 2.5–4 cm. latis, tenuiter coriaceis, ellipticis, longe acutatis, interdum subfalcatis, glaberrimis, venis utrinque 8-jugis latius patentibus; petiolo brevissimo 2 mm. longo, stipulis triangulari-acuminatis, glaberrimis, integris, marcescentibus. Flore ♂: pedicello capilliformi, plus minusve flexuoso ad 1 cm. longo, perianthii lobis 5, acutato-callosis, staminibus ut videtur 3 in columnam coalitis. Flore ♀:

pedicello apice leviter subincrassato, rigido, capilliformi ad 2–2.5 cm. longo, perianthii lobis sub fructu reflexis ad 5 mm. longis, apice acutatis. Fructu capsulari *Actephilae* ssp. mentiente, coccis delapsis convolutis ad 2 cm. longis, endocarpio corneo, exocarpio levi brunneo tenuissimo sub lente obscure punctulato, venulis obsito subreticulatis; columella ad 1 cm. longa.

CHINA: Kweichow, woods of "Kouan yn tóng" *Esquirol* 6076, 1200 m. alt.

The material was received in November 1922 at the Paris Museum, where it remained undetermined. The type-specimen is far from satisfactory, but a new species is indicated, somewhat resembling *P. album*, although quite distinct in the characters of its foliage and its fruits.

A specimen from Indochina, Tonkin, Thay Nguyen, Cho-ch, *Eberhardt* 3973, described as a shrub 12–18 feet tall, may prove to belong here, despite its much narrower leaves. Its venation would seem to preclude its reference to *P. carinatum* (Beille) Croiz.

(3) Sect. *Calophyllum*

Phyllanthodendron Dunnianum Lévillé, Repert. Sp. Nov. **9**: 324. 1911, Fl. Kouy-Tchéou 166. 1914.

Phyllanthodendron Cavaleriei Lévillé, op. cit. 454, Fl. Kouy-Tchéou 166. 1914.

Phyllanthodendron Dunnianum Lévillé var. *hypoglaucum* Lévillé, Fl. Kouy-Tchéou 166. 1914.

Phyllanthus Dunnianus Hand.-Mazz. ex Rehd. Jour. Arnold Arb. **14**: 230. 1933.

A strong species, with the calyx-lobes in fruit larger than in any other representative of the genus I have so far seen. The bark of the branchlets tends to exfoliate. The leaves have a conspicuous whitish under surface and bear a type of indumentum which is altogether unusual for the Euphorbiaceae. Under a moderate magnification it is seen to consist of minute irregularly dissected lumps of an apparently resinous exudate. This exudate is doubtfully to be compared to a wax, and is probably analogous to that which appears on the undersurface of the leaves of certain Lauraceae.

Phyllanthodendron anthopotamicum (Hand.-Mazz.) comb. nov.

Phyllanthus anthopotamicus Hand.-Mazz. Symb. Sin. **7**: 223. 1931.

The leaves are smaller and more delicate than are those of *P. Dunnianum* but they bear the same peculiar indumentum, with added whitish, simple or sparingly fascicled hairs along the veins and veinlets. *Handel-Mazzetti* 91 = 10377, collected in S. W. Kweichow, seems at first to differ greatly from *Pételot* 5229, from Indochina, Tonkin, Mount Song-to-Van, Chapa, July 1931. This is described as thriving in humus on calcareous rocks exposed to the full sun at about 1600 m. altitude. The foliage of the *Pételot* material is brown, not whitish beneath, the leaves are slightly broader on the whole than are those of the *Handel-Mazzetti* collection. I am unable to find other differences, especially in the floral parts, however, and treat these two plants for the present at least as conspecific. The Euphorbiaceae of the region of Chapa are usually the same as those of Yunnan, but very seldom, if ever, the same as those of Kweichow.

(4) DOUBTFUL SPECIES

Phyllanthus rubicundus Beille was placed by Beille in the section *Phyllanthodendron* of *Phyllanthus* (Lecomte, Fl. Gén. Indo-Chine 5: 574. 1927). The holotype is a very poor specimen and my fragment of it is hardly satisfactory for the purposes of a critical work. It seems advisable to await the collection of better material before effecting the combination under *Phyllanthodendron*.

Dicoelia Benth

Dicoelia Beccariana Benth. in Hook. Ic. 23: 70. pl. 1289. 1879.

Little, if anything, has been heard of this species since its publication. A Sarawak specimen in our herbarium, originally distributed as *Trigonostemon*, *Native collector 1843*, being part of the material gathered through the Sarawak Museum for the Bureau of Science, Manila, probably belongs here. It is strikingly like a species of *Trigonostemon* in all its vegetative characters, but the capsules have two seeds in each cell. A second specimen in our herbarium, *Rahmat Si Boeea 7794*: Sumatra, East Coast, Vicinity of Hoeta Bagasan, Asahan, 1934–1935, has ♂ flowers only. The details of these specimens do not agree with those figured by Benth for *D. Beccariana* and by J. J. Smith for *D. affinis* (Bull. Jard. Bot. Buitenzorg 3 sér. 1: pl. 41, 42. 1920), but the foliage is reminiscent of *Dicoelia*. It is likely that this genus occurs also in the Philippines.

Cleistanthus Hooker f. (*Paracleisthus* Gagnepain)

Gagnepain segregated five species from *Cleistanthus* (Bull. Soc. Bot. France 70: 496–500. 1923, et in Lecomte Fl. Gén. Indo-Chine 5: 496–501. 1927) and proposed for them the new genus *Paracleisthus*. The generic characters of *Paracleisthus* are to be found, Gagnepain avers, in the position and attachment of the ovule: the ovule is pendulous and the obturator (probably the *operculum* of Gagnepain) and funiculus are single in *Cleistanthus*; on the contrary, the ovule is ascending, the funicles are distinct, and the obturator is not present in *Paracleisthus*.

The validity of *Paracleisthus* has been challenged so far but once, by Merrill & Chun (Sunyatsenia 1: 64. 1930), who, affirming the nomenclatural priority of *Cleistanthus Saichikii* Merr., July 24, 1923, over that of *Paracleisthus subgracilis* Gagnep., August 2, 1923, state incidentally, "We reduce the genus *Paracleisthus* to *Cleistanthus*." Pax & Hoffmann (Engl. & Prantl. Nat. Pflanzenf. ed. 2, 19(c): 232. 1931) err in crediting to Gagnepain the publication of a genus *Paracroton*, of which they say, "Bau und Orientierung der Samenanlage sprechen gegen eine Euphorbiacea." Since Pax & Hoffmann refer this genus to the page of the Flore Générale where *Paracleisthus* is described, if not actually published, it is plain that their *Paracroton* is an error for *Paracleisthus*. Their comment that the structure and the position of the ovule are incompatible with an euphorbiaceous plant is unexplainable, because Gagnepain has placed under *Paracleisthus* two well known species of *Cleistanthus*, *C. siamensis* Craib and *C. tonkinensis* Jabl.

I fail to see in Gagnepain's description of the ovulation and placentation of *Paracleisthus* anything which justifies accepting this group as a genus. In his key Gagnepain (in Lecomte, Fl. Gén. Indo-Chine **5**: 235. 1925) states that the ovules of *Paracleisthus* are ascending and have no funicle. This is not borne out by his own illustrations. A manifest funicle is shown in the various species of *Paracleisthus* which he figures, and the position of the point of attachment of the funicle is also shown to vary, being slightly below the middle of the seed in *P. subgracilis* (op. cit. 502. fig. 64, 7) and absolutely basal in *P. tonkinensis* (op. cit. 502. fig. 64, 10). All the ovules of these species, moreover, are *anatropous* even when they are *ascending*, because in them the hilum is central between the micropyle and the chalaza. Gagnepain's confused interpretation of the carpel structures of *Cleistanthus* and *Paracleisthus* appears to be based upon the misapprehension that an ascending ovule is necessarily orthotropous, which is far from being the case. In referring to an "operculum," Gagnepain probably confuses the caruncle with the obturator; these, however, are different organs (see Schweiger, Flora **94**: 339-379. 1905).

Cleistanthus Eberhardtii (Gagnep.) comb. nov.

Paracleisthus Eberhardtii Gagnep. Bull. Soc. Bot. France **70**: 499. 1923, et in Lecomte, Fl. Gén. Indo-Chine **5**: 501. 1926.

A fragment of the holotype is in our herbarium. The species is from Annam and is unlike the others described under *Cleistanthus* and *Paracleisthus* by Gagnepain. It may prove to be very near *C. anomalus* Merr. & Metc.

Cleistanthus Pierrei (Gagnep.) comb. nov.

Paracleisthus Pierrei Gagnep. Bull. Soc. Bot. France **70**: 500. 1923, et in Lecomte, Fl. Gén. Indo-Chine **5**: 498. 1926.

A number of forms and species are in this vicinity which require critical attention. *Cleistanthus Helferi* Hook. f., as represented by *Helfer* 4886, cited by Hooker (Fl. Brit. Ind. **5**: 280. 1887), appears to be distinct from *C. Pierrei* and *C. siamensis* Craib. *Pierre* 1853, collected at Bao-Chiang, Bien-Hoa Prov., Cochinchina, probably represents another state of the same plant identified by Gagnepain as *P. Pierrei*.

Cleistanthus tonkinensis Jabl. Pflanzenr. **65** (iv. 147. viii): 16. 1915.

Paracleisthus tonkinensis Gagnep. Bull. Soc. Bot. France **70**: 497. 1923, et in Lecomte, Fl. Gén. Indo-Chine **5**: 499. 1926.

Cleistanthus sageretioides Merrill mss. in sched.

This proves to be a common species in Tonkin, to judge from the numerous collections received here in the last five years. It is very easily identified on account of the axillary tufts of brownish hair at the axils of the main veins. The axes bearing flowers also tend to specialize into strictly floriferous brachyblasts, thus approaching *Amanoa*, which Baillon correctly placed near *Bridelia* (Etud. Gén. Euphorb. 580. 1858), consequently near *Cleistanthus*.

A new record for the flora of China is: *Tsang* 22100, Kwangsi, Shap Man Taai Shan, "fairly common in dry clay," April, 1933, originally determined as "*Rhamnus* sp."

Merrill's manuscript binomial has been rather extensively used in herbaria and should be cited.

Cleistanthus indochinensis Merrill mss. in sched., sp. nov.

Arbuscula. Foliis 14–8 cm. longis, 5–3.5 cm. latis, ellipticis, cuspidato-caudatis, basi rotundatis vel cuneato-rotundatis, tenuiter chartaceis, glaberrimis, margine integerrimo calloso hyalino, saepius repandulo, venis omnibus delicatis, primariis utrinque 7–10-jugis; petiolo gracili brunneo-ruguloso, 3–5 mm. longo, stipulis petiolaribus late triangularibus apice setaceis 1–2 mm. longis, margine abaxiali saepius hyalino, integro. Inflorescentiis cymosis axillaribus, in ramulis ipsis vel secus brachyblasta gracilia hispidula congestis. Flore ♂: perianthio glabro, late obconico 4.5 mm. longo ad 6 mm. lato, ultra medium in lobos 5, 2 mm. longis, 1.75 mm. latis, late triangularibus partito; disco callosulo, margine eroso, ligulis ornato late flabellatis ca. 1 mm. longis; columna staminalis ca. 1.5 mm. longa, pistillodio pro ratione columnae sat valido; staminibus 5, filamentorum parte libera vix 0.5 mm. longa, antheris ca. 0.75 mm. longis. Flore ♀ sub fructu immaturo tanto viso: perianthio ut in ♂, lobis 5, 3–5-nerviis, triangulari-acutatis 3 mm. longis, 1 mm. latis, disco subalutaceo integro 1.5 mm. alto, ligulis ad 2 mm. longis, 1 mm. latis, spathulato-rotundatis, bene pedunculatis, sub lente acri glandulosis; capsula 3–4-loculari, submatura ca. 1 cm. lata, 7 mm. longa, stylis patentibus apice bifidis, pericarpio levi, pallide brunneo.

INDO-CHINA: Tonkin, Hoa-Binh Province between Hoa Binh and Vu Ban, *Pételot* 6397, May 1938.

A second collection from the same locality, with the habitat described as a very damp gully ("un ravin très humide"), is *Pételot* 6528, May 1938. The nearly mature capsules of this specimen have been used in drawing up the specific description. *Cleistanthus indochinensis* appears to be closely allied to *C. Eberhardtii*, but it differs in its stipule, inflorescence and leaf-characters.

Cleistanthus Petelotii Merrill mss. in sched., sp. nov.

Arbuscula 7–8 metralis, glabra. Foliis 15–8 cm. longis, 7–3 cm. latis, coriaceis, glabris, apice breviter acuminatis, basi longius gradatimque cuneatis vel rotundato-cuneatis, margine plus minusve revolutis, venis 6–7-jugis sub marginem curvantibus vel curvato-anastomosantibus, trabeculis conspicuius; petiolo rugoso, glabro vix 5–6 mm. longo. Flore ♂: perianthio glabro, 5 mm. longo, 4.5 mm. lato, obconico, ultra medium in lobos 5 triangulari-acuminatos 3 mm. longos, 1 mm. latos partito; disco 1 mm. alto, ligulis obovatis erosulis ad 1 mm. longis, columna staminali ca. 2 mm. longa, staminibus 5, filamenti parte libera ca. 1 mm. longa, antheris triangularibus apice in connectivum trigonum breve productis, antheris 0.6 mm. longis. Flore ♀: perianthio paene ♂, 5 mm. magno; disco integro 2 mm. alto, ligulis minimis, ovario globuloso, levi, basi setis lutescentibus cincto, ca. 2 mm. magno, stylis 3 apice subpartitis glandulosulis.

INDO-CHINA: Tonkin, Hoa Binh Province, Muong Thon, road from Hanoi to Hoa Binh, *Pételot* 6396, May, 1938.

A second collection is *Pételot* 6385: Tonkin, Langson Province, between Dong Mô and Van Linh, April, 1938. This new species is outstanding, being characterized by a robust habit and thickish leaves with a sharply etched venation. Its foliage and facies are reminiscent of *Gelonium* Roxb.

Cleistanthus concinnus sp. nov.

Fruticulus videtur ramulosus, innovationibus longa parte pube hispidula rubro-brunnea confertius indutis. Foliis coriaceis, 4–2 cm. longis, 1.5–0.5 cm. latis, supra griseis, subtus pallide brunneis vel cinerascentibus, pro more generis parvis, pube rara ad costam venas limbumque adpersis, nervis utrinque delicatis revera haud obscuris, utrinque ca. 9-jugis; petiolo hispidulo, 1–3 mm. longo, stipulis petiolaribus 1 mm. longis, unguicularibus, vix setaceis, pubescentibus. Floribus ♂ haud visis. Perianthio ♀ sub fructu 5-lobato, ca. 4 mm. lato, circa ad medium partito, glabro, brevissime pedicellato vel subsessili, pedicello 1.5 mm. longo, columella 3–3.5 mm. longa, coccis delapsis 8 mm. longis, involutis, firmitus sublignosis, pericarpio levissimo sparse glanduloso-punctato; semine *Vitis* ssp. figura atque mole simili, forma cordato, ad chalazam valde impresso sublobulato, hilo sub-centrali.

INDO-CHINA: Annam, Phanrang Province, a shrub in dry rocky soil, *Poilane* 12440, Oct. 1925.

Other collections from the same region are: *Poilane* 12457, from Phanrang Province, Cana, open rocks at 1200 m. alt., Oct. 1925, and *Poilane* 2873, vicinity of Nhatrang, Island of Tré, March 1922. The last was determined by Gagnepain as representing *Paracleisthus siamensis*.

Cleistanthus concinnus, *C. siamensis*, *C. Pierrei* and *C. anomalus* are closely related species, apparently characteristic of the flora of the coastal Indo-chinese belt, from Pulo Condor to Hainan and Hongkong. The relationships of the species in this range among themselves and with those of the mainland is still largely conjectural.

Croton Linnaeus**Croton murex** sp. nov.

Frutex vel arbuscula ad 1 m. altus. Ramulorum apicibus grosse dissiteque stellato-tomentosis vel argillaceo-stellatis, subserius glabratibus. Foliis 10–6 cm. longis, 3–1.5 cm. latis, distanter verticillatis, rarius alternatis vel oppositis, utrinque pilis stellatis albis paucioribus conspersis subglabratibusve, elliptico-lanceolatis, acuminatis vel caudato-acuminatis, basi cuneato-rotundatis vel cuneatis, glandulis 2 stipitatis posticis insignitis, margine obiter distanteque serrulatis vel repandulo-serratis, glandulis marginalibus nullis; petiolo 0.3–10 mm. longo. Inflorescentiis ad 4 cm. longis, rachide sub-filiformi, bracteis minutis. Floribus ♂ immaturis, alabastris pedicellatis, pedicello 2–5 mm. longo, substellato-tomentosis vel glabratibus. Floribus ♀ parcius stellato-tomentosis: pedicello in anthesi 2 mm. longo, sub fructu 5–6 mm. longo; calyce fere ad basim partito, 4–5 mm. lato, lobis triangulari-lanceolatis, integris, intus glabratibus, ad 2 mm. longis, petalis subnullis glandulosis; ovario ca. 2–3 mm. magno sub lente nigricante, muricato, muricibus (licet processibus carnosulis) praesertim in apice grosse stellato-hispidis, stylis fere ad basim partitis, 4 mm. longis, subulatis, in dorso parcius stellato-tomentosis; capsula (fracta) saltem in dorso coccorum muricata, videtur ad 6 mm. magna.

INDO-CHINA: Annam, 12 km. north of Dankia-Langbiang, a shrub in undergrowth, 1 m. tall, alt. 1200–1500 m., *Poilane* 18657.

This new species suggests the gross morphology of *C. calococcus* Kurz

and *C. Bonianus* Gagnep., but is easily separated from both by its muricate capsules. It differs from *C. alpinus* Gagnep., which has a similar capsule, in the foliage and in numerous intangibles.

***Croton kwangsiensis* sp. nov.**

Frutex ad 4–5 ped. altus. Apicibus tomentosis, indumento rubiginoso vel ochraceo sat grosso. Foliis 16–8 cm. longis, 7–3.5 cm. latis, elliptico-lanceolatis, apice longiuscule acuminatis vel cuspidatis, basi plus minusve rotundatis, firme chartaceis, olivaceis vel brunneo-olivaceis, supra glabrescentibus vel glabris, subtus tomentosis, tomento pallide rubiginoso vel ochraceo, conferto, margine integro glandulis lutescentibus sessilibus obsito, venis saepius supra impressis ca. 6–8 jugis, primo jugo valde adscendente, caeteris plus minusve patentibus; petiolo 1–2 cm. longo, apice glandulis stipitatis patelliformibus 2 insignito. Inflorescentiis subspicatis 2-sexualibus. Floribus ♂ haud visi. Floribus ♀: perianthio ca. 8 mm. lato, subsessili vel brevissime pedicellato (pedicello nec ultra 2 mm. longo), lobis ligulatis, abrupte acutatis 4 mm. longis, 1 mm. latis, pubescentibus, integerrimis; petalis: ligulis setaceis intra lobos; disco e glandulis 5, supra dilatatis, nigricantibus; ovario globoso ca. 3 mm. magno, hispidulo, albicante vel lutescente, stylis 3, liberis, infra tomentosis, supra glabratis nigricantibus, totis ca. 6 mm. longis; columella gracili ca. 5 mm. longa.

CHINA: Kwangsi, Ling-chuan District, fairly common in clay, *Tsang W. T.* 27879, July 1937.

Fairly near *C. latsoniensis* Gagnep., but a less robust plant with more delicate flowers.

***Croton potabilis* sp. nov.**

Arbor ad 10–12 m. alta. Apicibus lepidotis, cupreis, citius glabratis. Foliis 13–5 cm. longis, 5–1.5 cm. latis, firme chartaceis, supra brunneis, subtus argenteo-lepidotis, hic inde maculis cupreis minutissime adspersis, elliptico-lanceolatis utrinque acuminatis, apice acutatis vel cuspidatis, basi arctius cuneatis, venis primariis ca. 8-jugis, margine integro; petiolo 1–3 cm. longo, glandulis minimis sessilibus apice insignito. Inflorescentiis subspicatis, simplicibus 2-sexualibus. Floribus ♂ haud visis. Floribus ♀: perianthio 4 mm. longo, 4 mm. lato, pedicello graciliore per anthesim ca. 5 mm. longo, sub fructu ad 8–10 mm. longo; lobis 5 ca. 3 mm. longis, 1 mm. latis, elliptico-lanceolatis ovarium occultantibus; petalis nullis; ovario globoso ca. 2.5–3 mm. magno, cupreato-lepidoto, stylis 3, fere ad basim liberis, parte infera integra lepidota, 2 mm. longa, supera partita, carnea, 2.5 mm. longa; fructu (ex *Clemens* 3842) capsulari delicato, rubiginoso-lepidoto, globuloso, ca. 5 mm. magno, columella gracillima ad 4.5–5 mm. longa; semine brunneo, levi, 3.5 mm. longo, 3 mm. lato, caruncula more proprio flabellata cum hilo contigua.

INDO-CHINA: Annam, Moi Lanh, Quang-Tri Prov., drunk by the natives in infusion as tea, native name: "Côn che," *Poilane* 10426 TYPE, May 1924. Other collections: Annam, Mt. Bana, small tree in forest, *J. & M. S. Clemens* 3842, 1927; Annam, Ba-na, near Tourane, *Poilane* 7342, 1923.

Gagnepain has described *C. argyratus* Bl. var. *microcarpa* Gagnep. (in Lecomte, Fl. Gén. Indo-Chine 5: 277, 1925) and given of this presumed variety a description that would fit *C. potabilis*. I do not know what Gagnepain intends by this variety. The *Poilane* material cited here is de-

terminated by Gagnepain himself as *C. argyratus* Bl., a species from which it differs almost at sight identification. *Croton potabilis* has a much smaller capsule than *C. argyratus* and is easily distinguished from *C. kongensis* Gagnep., *C. budopensis* Gagnep. and *C. scopuligenus* Croiz. by all its ♀ floral characters.

***Croton ignifex* sp. nov.**

Arbuscula ad 2.5 m. alta, graciliore. Apicibus diutius argillaceo-tomentosis, indumento pallide ochraceo confertiore. Foliis 5–2.5 cm. longis, 2–1 cm. latis, coriaceis, ellipticis, apice abrupte acuminatis vel rotundatis, basi cuneatis, in sicco pallide olivaceis, margine calloso vix dentato-crenulato, venis ca. 6-jugis, adscendentibus, trabeculis ut venis primariis conspicuis; petiolo 3–8 mm. longo, glandulis minimis. Inflorescentiis subspicatis. Floribus ♂ haud visis. Floribus ♀: perianthio ca. 2 mm. magno, pedicello vix 2 mm. longo; petalis brunneis, ligulatis, vix 1.5 mm. longis vel brevioribus, lobis triangulari-acuminatis ad 1.5–2 mm. longis; ovario globuloso albicante, lepidoto-tomentoso, ad tertium superum e perianthio libero, ca. 2 mm. magno; stylis 3 liberis fere ad basem imam partitis, nigricantibus, ca. 2 mm. longis.

INDO-CHINA: Annam, Island of Tré, a small tree, abundant in the southern part of the island and much used for making torches, *Poilane* 2922, April 1922. Here apparently falls: *Nielsen* 607 E., Nhatrang, Indochina, May 1929.

A characteristically xerophilous plant, with small and coriaceous leaves. It belongs in the affinity of *C. robustus* Kurz, from Southern Burma.

***Croton scopuligenus* sp. nov.**

Frutex humilis vix 0.30 m. altus. Apicibus cupreato-lepidotis, foliorum delapsorum stipulis triangularibus obsitis. Foliis 4.5–2 cm. longis, 4–2 cm. latis, ovatis, apice late acuminatis saepius apiculatis, basi rotundatis, supra brunneis vel rubro-brunneis, subtus subargenteo-lepidotis, venis utrinque ca. 4-jugis, primo jugo plus minusve adscendente, caeteris late patentibus; petiolo 0.5–1.5 cm. longo, lepidoto, apice glandulis 2 patelliformibus insignito, basi stipulis triangulari-acuminatis ad 3 mm. longis aucto. Inflorescentiis, ut videtur, brevibus, conferte lepidotis. Floribus ♂ haud visis. Perianthio ♀ ca. 2 mm. magno, pedicello 1–2 mm. longo; petalis minimis vel nullis; lobis triangularibus 2 mm. longis, basi 2 mm. latis, lepidotis; ovario videtur turbinato, i.e. apice latiore, 2 mm. longo, 4 mm. lato, toto conferte lepidoto; stylis 3, nigricantibus, liberis, quove fere ad basim partito.

INDO-CHINA: Annam, "Signal de 1200 m." west of Cana, *Evrard* 2392, November 1925.

This new species is certainly not *C. argyratus* Bl. or the species immediately allied with it (*C. budopensis*, *C. potabilis*). It agrees only with *C. kongensis* Gagnep., having an essentially similar ♀ flower. It differs from *C. kongensis*, however, in the venation and the shape of the leaves, these being as a rule manifestly lanceolate in that species; in the much larger and much more persistent petiolar stipules; in the habit and size; in the range, *C. kongensis* being restricted to Laos and Yunnan. *C. scopuligenus*, like *C. ignifex*, seems to be one of the xerophilous shrubs characteristic of the vegetation of the coast of southern Annam.

***Croton phuquocensis* sp. nov.**

Arbor videtur vel frutex. Apicibus parcissime stellatis, subglabris. Foliis oblanceolatis vel ellipticis, in sicco brunneis, 15–7 cm. longis, 4–3 cm. latis, apice abrupte acuminatis, ad basem longe cuneatis, margine subintegro, venis ca. 10–16 jugis adscendentibus, limbo subtus minute papilloso-punctulato; petiolo gracili 1.5–4 cm. longo, apice glandulis 2 parvis patelliformibus ornato. Inflorescentiis subspicatis simplicibus. Floribus ♂ haud visis. Floribus ♀: perianthio e lobis imbricatis, ovarium totum occultantibus, ca. 3 mm. longo, 6 mm. lato; petalis nullis; lobis ovatis, latius imbricativis, subpetaloideis, apice plus minusve callosis, 2.5 mm. longis, ca. 2 mm. latis; glandula ad basem lobis cujusvis 1, utrinque glandulis 2 multoties minoribus obsita, discum totis sub ovario formantibus; ovario trigono depresso-globoso, 1 mm. longo, 2 mm. lato, luteo-lepidoto, apice parcius setuloso; stylis 3, liberis, late patentibus, apice bifidis.

INDO-CHINA: Cochinchina, Island of Phu-quoc, Mt. Retram, *Pierre* 6255, 1874.

Gagnepain has determined this plant as *C. leiophyllus* Muell.-Arg. (in Lecomte, Fl. Gén. Indo-Chine 5: 273. 1925), which I believe to be an error. The perianth and the venation are characteristic.

***Croton pontis* sp. nov.**

Frutex ver arbuscula. Apicibus subglabris, trichomatibus stellatis ca. 15-radiatis parcius adpersis. Foliis in sicco brunneis, 15–9 cm. longis, 4–2 cm. latis, glabris, chartaceis, lanceolatis, utrinque acutatis, venis ca. 7–9-jugis, adscendentibus, a margine 5–3 mm. anastomosantibus, margine serrato (serraturis ca. 5–7 per cm. 2 longitudinis); petiolo 1–1.5 cm. longo, apice utrinque glandulis disciformibus stipitatis 2 onusto. Inflorescentiis subspicatis ca. 10 cm. longis, gracilibus, floribus ♀ singulis, ♂ ad 5 capitulatis. Floris ♂ alabastro ca. 2 mm. magno, staminibus ca. 12. Floribus ♀: perianthio ca. 2 mm. lato, 4 mm. longo, pedicello 1–1.5 mm. longo; petalis nullis; lobis ligulatis, apice acutatis 1.5 mm. longis, 1 mm. latis, glabris; ovario tomentuloso albicante vel lutescente, ca. 1.5 mm. magno; stylis liberis, 3, ca. 2.5 mm. longis, quove ad medium circa partito.

INDO-CHINA: Tonkin, gully above the "Pont des Linhs," Vin Yen Province, at 50 m. alt., *Pételot* 6504, April 1935.

Croton pontis belongs to sect. *Gymnocroton* Baill. It differs from *C. Hookeri* Croiz., discussed in a previous issue of this Journal (Jour. Arnold Arb. 21: 498. 1940), in the definitely more lanceolate and more deeply serrate foliage, in the much narrower lobes of the ♀ calyx, and in intangibles throughout. It is different from *C. phuquocensis* in every detail of its ♀ flower.

***Croton caryocarpus* sp. nov.**

Arbor parva ad 5–6 m. alta. Apicibus tomentellis lutescentibus indumento interdum sublepidoto, demum glabratis. Foliis 13–8 cm. longis, 5–3 cm. latis, ellipticis vel elliptico-lanceolatis, subcoriaceis vel firme chartaceis, in sicco pallide olivaceis vel pallide luteo-brunneis, adultis glabratis, margine subcartilagineo obscure dentato, venis ca. 9–12-jugis, gracilioribus, late patentibus, sub marginem inconspicue anastomosantibus; petiolo argillaceo tomentoso, 0.5–3 cm. longo, glandulis 2 in apice ad limbum valde obscuris. Inflorescentiis 2-sexualibus, terminalibus vel axillaribus sub-

terminalibus, 10–15 cm. longis. Floribus ♂ : perianthio ca. 5–6 mm. longo, 2–3 mm. lato, pedicello ca. 3 mm. longo; staminibus ca. 10, filamentis ad 1 cm. longis, petalis lobis subsimilibus 2–3 mm. longis, lanceolato-ovatis vel obovatis, glandulis intrapetioleis ca. 5. Floribus ♀ : perianthio ca. 5 mm. lato, 2 mm. longo, pedicello crassiore 2.5–3 mm. longo; petalis nullis; lobis carnosulis, apice glandulosis, interdum coarctatis, 2 mm. longis 3 mm. latis; ovario ellipsoideo aureo-lepidoto, 4 mm. longo, 3 mm. crasso; stylis 3 liberis, nigris, quove paulo supra basem bifido, ad 3 mm. longo; disci glandulis (videtur) valde inconspicuis; fructu magno, ellipsoideo, 3 cm. longo, 2 cm. lato, drupam mentiente, vix trisulco durissimo, toto tenuissime aureo-tomentello, indumento vulgo detergibili.

INDO-CHINA: Tonkin, between Kep and Pho Vi, Bac Giang Province, in light forest, *Pételot* 6487, May 1936.

There seems to be a close agreement between the holotype and the following collections: *Bon* 4678, Western Tonkin; *Poilane* 1468, Annam, Tourane 1920; *J. & M. S. Clemens* 3690 and 3968, Annam, Tourane and vicinity. Gagnepain assimilates this new species into *C. Joufra* (in Lecomte, *Fl. Gén. Indo-Chine* 5: 280. 1925), to which he attributes the range Tonkin-Annam-Siam-Cochinchina. This range is the result of the misinterpretation of several species as *C. Joufra*, which to the best of my knowledge has not been found so far in Indochina. *Griffith* 4776 and *Shaik Mokim* from Assam and Upper Burma are two of the numerous specimens that represent in our herbarium the true *C. Joufra* Roxb. This species and *C. caryocarpus* differ less in definite characters than in sums of intangibles. *Croton caryocarpus*, so far as seen, does not have petals in the ♀ flower, its leaves are more coriaceous, its fruit is thicker, and its seed has a smaller hilum than in *C. Joufra*. It is worthy of note that many are the species of *Croton* in Asia and Australasia which have similar vegetative characters but differ considerably in the size and nature of their fruits. It is due to this peculiarity that *C. oblongifolius*, *C. Joufra*, *C. argyratus* and *C. laevigatus* are confused with many other actually unrelated species in every work that deals with the flora of the tropical Far East.

***Croton Kurzii* nom. nov.**

Croton flocculosus Kurz, *For. Fl.* 2: 375. 1877; Hooker f., *Fl. Brit. Ind.* 5: 394. 1887. *Non Geiseler* (1807).

Kurz's binomial is a later homonym of Geiseler's (*Crot. Monogr.* 14. 1807). The material which represents *C. flocculosus* Kurz in the Kew herbarium, according to notes I hastily took in the winter of 1938, resembles *C. yunnanensis* W. W. Smith, from S. W. China, differing from it in the much thinner deciduous indumentum and the range. *Croton Kurzii* is not represented in our herbarium.

***Croton limiticola* sp. nov.**

Frutex bipedalis. Foliis 22–10 cm. longis, 9–3.5 cm. latis, subpergameneis, elliptico-lanceolatis vel oblongo-lanceolatis, apice acuminatis, basi cuneatis vel cuneato-rotundatis, venis primariis utrinque 7–13 bene anastomosatis, latiuscule adscendentibus, margine distante obiterque crenato-serrato, glandula in crena quave stipitata disciformi subsessili; indumento

toto in ramulis foliisque e pilis stellatis robustioribus lutescentibus dissitis; petiolo 0.5–3.5 cm. longo, apice sub lamina ipsa glandulis 2 disciformibus insignito. Inflorescentiis spiciformibus axillaribus vel apicalibus, 1- vel 2-sexualibus, ad 7 cm. longis. Floribus ♂ : perianthio vix tomentoso, 8 mm. lato, lobis 5 ovato-ellipticis, 3 mm. longis, 2.5 mm. latis, petalis in laciniis 7–8 ciliato-fimbriatis dissitis, ca. 2 mm. longis, staminibus 13–15. Floribus ♀ : perianthio vix tomentoso profunde partito ad 1 cm. lato, pedicello 8 mm. longo, lobis 5, lanceolatis, apice breviter acuminatis, integerrimis, eglandulosis, 5 mm. longis, 2 mm. latis, petalis minutis vel (videtur) interdum nullis; ovario ellipsoideo grosse lepidoto, lutescente, ad 2.5 mm. longo, disco (videtur) nullo; stylis ad 3 mm. longis, stigmate crasso ad 1 mm. lato, haud revolutum, sulcatum, apicem in processum productum, vix papilloso; capsula aureo-lepidota, profunde trigona, 5 mm. longa, 5 mm. crassa.

INDO-CHINA: Tonkin, Taai Wong Mo Shan and vicinity, *Tsang* 29584, Sept. 1939.

A strongly marked species, related to *C. erythrostachys* Hook. f. and, more distantly, to *C. Merrillianus* Croiz. The foliage is unlike that of *C. Hancei* Benth.

Croton laevigatus Vahl, *Symb.* **2**: 97. 1791; Muell.-Arg. in DC. *Prodr.* **15**(2): 523. 1866; Merrill in *Lign. Jour. Sci.* **13**: 59. 1934. -

No ♀ flowers were left on the holotype of *C. laevigatus* when I inspected it in February 1939. Since the species of its affinity are numerous and can be distinguished only when ♀ flowers and fruits are available, the value of the Vahl's holotype as a taxonomic standard is now much impaired. It is convenient, however, to retain the binomial for the species of *Croton* in Hainan which most closely matches the leaves of Vahl's holotype. I accept, consequently, as *C. laevigatus* the following specimens, all collected in Hainan: *Lau* 108, 1350; *Chun & Tso* 70281; *How* 70471; *Liang* 62777, 63311, 63321; *Wang* 34723, 34766, 35084.

Croton laevigatus does not occur outside of Hainan, so far as I know at present. It is not *C. oblongifolius* Roxb., an isotype of which is represented in our herbarium by a fragment with ♀ flowers kindly given to the writer by Prof. H. Humbert of the Museum of Natural History of Paris.

Croton Laui Merrill & Metcalf, *Lign. Jour. Sci.* **16**: 389. 1937.

Croton hainanensis Merr. & Metc. op. cit. 391. Syn. Nov.

The variability of the indument in good series of specimens is such that two distinct species cannot be recognized. *How* 70548 connects *C. hainanensis* with *Lau* 1566, type of *C. Laui*.

Croton cascarilloides Raeuschel, *Nomencl. Bot.* ed. 3. 280. 1797; Merr. *Trans. Amer. Phil. Soc.* ii. **24**(2): 234. 1935 (Comment. Loureiro Fl. Cochinch.).

Croton punctatus Lour. *Fl. Cochinch.* 581. 1790. Non Jacq.

Croton Cumingii Muell.-Arg. *Linnaea* **34**: 101. 1865, et in DC. *Prodr.* **15**(2): 566. 1866; Gagnepain in Lecomte, *Fl. Gén. Indo-Chine* **5**: 264. 1925.

Croton Cumingii var. *angustifolius* Gagnep. l.c. Syn. Nov.

Croton Pierrei Gagnep. *Bull. Soc. Bot. France* **68**: 558. 1921, et in Lecomte, *Fl. Gén. Indo-Chine* **5**: 265. Syn. Nov.

Croton Cumingii var. *angustifolius* Gagnep. is apparently based upon shoots of new growth arising from wood that has been dormant a long time, and it cannot be accepted otherwise than as a vegetative state of the

typical form. *Poilane 1725*, the holotype of Gagnepain's variety, is a good match of *Clemens 3929*, collected near Hué. Another so-called variety under *Croton*, having the same status as *C. Cumingii* var. *angustifolius*, is the West Indian *C. organifolius* Lam. var. *abbreviatus* Urban.

Gagnepain separates *C. Pierrei* from *C. cascarilloides* in his key by differences in the styles. His faith in such characters is well known. I regret that I can not follow him, as I can find no difference between *Pierre 6233*, the holotype of *C. Pierrei*, of which a fragment is available here, and a score of specimens which certainly belong to *C. Cumingii* Muell.-Arg.

Alchornea Swartz

Alchornea androgyna sp. nov.

Arbuscula ad 4–5 m. alta. Innovationibus pube subfasciculata hispido-tomentellis. Foliis ovato-ellipticis vel ellipticis, 18–10 cm. longis, 9–6 cm. latis, subtus ad venas venulasque hispido-velutinosus, supra glabrescentibus, margine dentato-serratis, dentibus apice subcallosis breviter cuspidato-acuminatis, basi plus minusve rotundatis, glandulis habitu stipulaceo in apice petioli anticis 2, venis arcte adscendentibus utrinque ad 4–5-jugis, primo jugo longitudinem dimidiam laminae subaequante ergo nervatione eximie 3-plinervia, petiolo 2–4 cm. longo. Inflorescentia terminali, paniculatum decomposita: floribus ♂ glomerulatis, ♀ singulis. Flore ♂ sessili, minimo, lobis late triangularibus vel ovatis, subscariosis, vix 0.75–1 mm. longis, staminibus ca. 5. Flore ♀ sessili vel breviter pedicellato basi utrinque valde glanduloso, lobis lineari-acuminatis ad 2 mm. longis; ovario ellipsoideo ad 3 mm. longo, 2 mm. lato; stylis 3, crassiusculis, subulatis, late patentibus, tenuissime papillosis vel epapillosis, apice vix convolutis vel patentibus.

INDO-CHINA: Tonkin, between Kep and Pho Vi, Bac Giang Prov., *Pételot 6262*, June 1936.

The androgynous cymes and the 3-plinerved venation distinguish this new species from *A. rugosa* Muell.-Arg., which it superficially resembles. *Alchornea annamensis* Gagnep., which has 3-plinerved or nearly 3-plinerved venation, is altogether glabrous and has a much more slender inflorescence.

Ptychopyxis Miquel

As treated here, *Ptychopyxis* Miq. (Fl. Ind. Bat. Suppl. 402. 1860) includes *Podadenia* Thw. (En. Pl. Zeyl. 273. 1861) and *Calpigyne* Bl. (Mus. Lugd. Bat. 2: 193. 1856). Blume's genus has priority but should be rejected as a *nomen confusum*. Blume erroneously believed that different plants, perhaps not even related as to family, constituted *Calpigyne*. He described the flowers of this genus in about 60 words, of which over half deal with the ♂ perianth. This perianth is totally alien to the ♀ plant which typifies *Calpigyne* in the herbarium of Leiden. Blume himself probably became aware of the error he had made, because the ♂ specimens from Celebes, cited first by him in the description of *Calpigyne*, cannot now be found (Prof. J. Lam, *in litt.*). Considering that to use *Calpigyne* a *descriptio emendata* would be necessary, it seems advisable to apply Art. 64

of the Rules of Nomenclature, taking up *Ptychopyxis* in substitution for *Calpigyne*, *nomen confusum propositum*.

Ridley (Fl. Malay Pen. **3**: 295. 1924) recognizes four species of *Ptychopyxis* having fruits both "small smooth" (*P. angustifolia*) and "with long processes" (*P. Caput-Medusae*). By so doing Ridley denies generic validity to the nature of the epicarp in this group. The soundness of Ridley's understanding of *Ptychopyxis* is proved by the material in our herbarium. *Maingay 1445* and *Henderson 34800*, representing *P. Caput-Medusae*, cannot be separated generically from *Thwaites 3428*, an isotype of *Podadenia Thwaitesii*; both of these species have fruits of the same nature and vegetative and floral characters which are similar. Such specimens as *Elmer 21524*, from Borneo, suggest at first sight an entity which differs from *Ptychopyxis* by having a much smaller fruit without processes. The value of this character for generic differentiation, however, practically vanishes when it is seen that *Krukoff 4094*, from Sumatra, has a smooth fruit 3.5 cm. long and 2 cm. broad. Thus the only character that could be used to break up *Ptychopyxis* into two genera is the nature of the indument of the capsule. The value of this character is far from decisive in the Euphorbiaceae, so that it seems altogether advisable to accept the following classification:

(1) **Ptychopyxis** Miq. subg. **Podadenia** (Thw.) comb. nov.

Fructibus majusculis, epicarpio processibus elongatis ornato.

Typus: *Ptychopyxis Caput-Medusae* (Hook. f.) Ridley.

(2) **Ptychopyxis** Miq. subg. **Neocalpigyne** subgen. nov.

Fructibus minoribus, epicarpio leviori tomentello.

Typus: *Ptychopyxis bacciformis* Croiz.

(1) Subg. **Podadenia**

Ptychopyxis Thwaitesii (Baill.) comb. nov.

Podadenia Thwaitesii (Baill.) Muell. Arg. in DC. Prodr. **15**(2): 791. 1866; Hooker

Fl. Brit. Ind. **5**: 423. 1887; Pax & Hoffm., Pflanzenr. **63** (iv. 147. vii): 20. 1914.

Podadenia sapida Thwait. Enum. Pl. Zeyl. 273. 1861.

The glandular indumentum of the ovary is altogether peculiar and is possibly formed by staminodes becoming connate with the epicarp.

Ptychopyxis Caput-Medusae (Hook. f.) Ridl. Fl. Malay Penins. **3**: 295. 1924.

Mallotus ? *Caput-Medusae* Hook. f. Fl. Brit. Ind. **5**: 443. 1887.

Hooker quotes Maingay to the effect that the processes of the fruit are stinging and describes them as "spines."

(2) Subg. **Neocalpigyne**

Ptychopyxis costata Miq. Fl. Ind. Batav. Suppl. 402. 1860; Ridley, Fl. Malay Penins.

3: 295. 1924; Hook. f. Fl. Brit. Ind. **5**: 455. 1887, et in Hook. Ic. **18**: pl. 1703. 1887.

The specimen available here has no fruit. Ridley thus describes the indumentum: "tomentum bright brown when dry."

Ptychopyxis angustifolia Gage, Rec. Bot. Surv. India **9**: 248. 1922; Ridley, Fl. Malay Penins. **3**: 296. 1924.

Ridley erroneously lists this binomial as a mss. name of Gage. The description of Gage strongly suggests *P. costata* Miq., but Ridley maintains *P. angustifolia* as distinct. I can find no difference between the fruit of the former and of the latter, as described by Ridley.

Ptychopyxis javanica (J. J. Sm.) comb. nov.

Podadenia javanica J. J. Sm. Mededeel. Dept. Landbouw. **10**: 387. 1910; Pax & Hoffm. Pflanzenr. **63** (iv. 147. vii): 21. 1914.

Smith does not describe the ♀ flower or the fruit. The two specimens previously cited, *Yates 2638* and *Krukoff 4094*, from the east coast of Sumatra, might belong here, from description.

Ptychopyxis philippina sp. nov.

Arbor innovationibus pube velutinoso-hispida aurantiaco-brunnea indutis. Foliis 15-10 cm. longis, 5-3.5 cm. latis, ellipticis, apice breviter acuminatis, basi rotundatis vel subcuneatis, integerrimis, cinereis, supra nitidis, venis ca. 7-jugis adscendentibus, glabris vel glabratis; glandulis in lamina secus costam 2-4; petiolo ad 2 cm. longo, stipulis petiolaribus obscuris glandulosis. Floribus ♂ in cymulis racemosis, perianthio in alabastro globuloso ca. 2 mm. magno, pedicello ca. 3 mm. longo rufo-hispidulo, staminibus ca. 40-50 late triangularibus, apice in connectivo late trigono productis; pistillodio minimo ellipsoideo 1 mm. longo. Floribus ♀ in cymis subspicatis subsessilibus oligofloris: perianthio 1 mm. alto, grosse lobulato, lobis ca. 5, petalis (staminodiis ?) minutis lobis similibus crassis cum calycis lobis alternatibus; ovario globuloso, 3.5 mm. magno, stylo brevissimo, stigmatibus papillosis reflexis 1 mm. longis; fructu capsulari, tenuiter pubescente, 3-4-loculari, indumento brunneo-aurantiaco, 1.5-2 cm. magno.

PHILIPPINE ISL.: Mindanao, Surigao, *Wenzel 2710* (♀), *3501* (♂), distributed as "*Podadenia* ?".

Ptychopyxis frutescens nom. nov.

Calpigyne frutescens Bl. Mus. Lugd. Bat. **2**: 193. 1856; Muell.-Arg. in DC. Prodr. **15**(2): 1255. 1866; Pax & Hoffm. Pflanzenr. **63** (iv. 147. vii): 254. 1914. *Syn. Nov. quoad spec. ♀ tantum.*

Foliis coriaceis brunneis bene clathratis, 14-8 cm. longis, 5-3 cm. latis, petiolo brevissimo. Flore ♀: calyce ca. 1.5 mm. alto, grosse lobulato, lobis minute triangularibus carnosulis, stylis 3 papillosis ad 1.5 mm. longis.

BORNEO: Pammaton leg. (Korthals) in herb. Lugd. Batav. [*frustulum in herb. Arnold. Arb. cum icone. photographica*].

The description is based upon a photograph and a fragment of the ♀ plant used by Blume in the generic description of *Calpigyne*. *Ptychopyxis frutescens* is a new name, not a new combination (see Rules Inter. Nomencl. 1935, Art. 69, last paragraph).

Ptychopyxis bacciformis sp. nov.

Coelodepas sp.? Merr. Univ. Calif. Publ. Bot. **15**: 156. 1929.

Innovationibus parcius pubescentibus vel glabratis, pube velutinoso-olivaceo-brunnea. Foliis 18-9 cm. longis, 5-3.5 cm. latis, ellipticis, ad basem longe ad apicem breviter acuminatis, integris, coriaceis, supra nitidis, optime clathratis, venis utrinque ca. 10-jugis, pilis simplicibus parcissime indutis, glandulis ad radicem ipsam petioli 2 cautissime inquirendis; petiolo hispidulo apice incrassato calloso 2-2.5 cm. longo, stipulis petiolaribus

glandulosis obscuris. Cymis ♀ fructigeris terminalibus, racemosis, velutinis, effusis, sat gracilibus at vix herbaceis, 12–20 cm. longis. Calyce sub fructu vix 3 mm. lato, lobis minimis 4–5; capsula velutinosi habitu bacciformi, indumento tomentello laete brunneo, 1.3–1.7 cm. lata, 1.5 cm. longa; semine vix maturo arillo venuloso praedito, ca. 1 cm. magno, dorso rotundato, facie ventrali applanato.

BRITISH NORTH BORNEO: Elphinstone Prov., Tawao, *Elmer* 21524, 1922–1923.

A second collection is *Elmer* 21771 from the same locality. The leaves are more definitely lanceolate than are those of *P. philippina*.

Ptychopyxis Poilanei sp. nov.

Arbor 18–20-metralis, innovationibus brevissime velutinosi, laete brunneis. Foliis 12–8 cm. longis, 4.5–2 cm. latis, ellipticis, apice brevissime acuminatis basi late rotundatis, coriaceis, integerrimis, venis adscendentibus utrinque ca. 8-jugis, glandulis ad basim laminae 2–4 lente cautissime inquirendis; petiolo ca. 2 cm. longo. Floribus ♂ tantum visis, in inflorescentiis velutinosi 2–4 cm. longis lateralibus cymulosis, bracteolis ad 4 mm. longis fultis; alabastro ca. 3 mm. magno, lobis crassis anisomeris 3–4; staminibus ca. 30–40 in acie 3–4-plici (videtur) alternatibus, pubescentia (staminodiis immaturis ?) hispida confertissima intermixtis, ca. 1 mm. longis.

INDO-CHINA: Annam, Nhatrang Prov., north of Nuh-hoa, eastern slopes of the "Massif de la Mère et de l'Enfant," *Poilane* 6398

The vegetative characters much resemble those of *Meliosma cambodiana* Pierre, but the ♂ flower is characteristic of *Ptychopyxis*.

Coelodepas Hasskarl (Nomen Genericum Conservandum Propositum)
(*Nephrostylus* Gagnepain; *Calpigyne* auct. non Blume)

The citations given under *Coelodepas* and *C. bantamense* by Pax & Hoffmann (Pflanzenr. **63** [iv. 147. vii]: 268–269. 1914) include several errors. They give 1855 as the year of publication of the genus, which was actually published only one year later (Versl. Med. Akad. Wetensch. Amsterdam **4**: 139. 1856). The spelling of the generic name appeared at first in the Greek version, *Koilodepas*, and was altered to *Coelodepas* in the following year (Flora **40**: 531. 1857). The type-binomial remained a *nomen nudum* until 1858 (Hort. Bogor. Descr. **1**: 44). This publication is cited by Pax & Hoffmann as "Retzia I. (1858) 45," but the actual title is "Hortus Bogoriensis descriptus sive Retziae Editio Nova." By citing "Retzia I" a very different publication is indicated, "Retzia sive Observationes Botanicae . . . Pugillus Primus," published by Hasskarl in 1855.

The validity and priority of the spelling *Koilodepas* over *Coelodepas* is unquestionable. *Koilodepas* is not a "clearly unintentional error" (Art. 70) and Hasskarl, having published it, had no right to alter it. The spelling *Coelodepas* has been retained, however, by every author who has dealt with the genus since Hasskarl's time and hence should be listed in the *nomina generica conservanda*.

It is worthy of note that Pax & Hoffmann (Engl. & Prantl, Nat. Pflanzen-

fam. ed. 2, **19(c)**: 124, 207. 1931) separate *Coelodepas* and *Nephrostylus* by 113 genera, although they are synonymous.

Coelodepas hainanense (Merr.) comb. nov.

Calpigyne hainanensis Merr. Jour. Arnold Arb. **6**: 135. (July 30) 1925.

Nephrostylus Poilanei Gagnep. Bull. Soc. Bot. France **72**: 476. (August 4) 1925, et in Lecomte, Fl. Gén. Indo-Chine **5**: 327. 1925.

No differences can be found by which the Hainan and Indo-China material can be distinguished. The fact that *Nephrostylus* is a synonym of *Coelodepas* can easily be verified, even without specimens, by comparing the following illustrations: (1) *Coelodepas Wallichianum* Benth. in Hook. Ic. **13**: 69. *pl.* 1288. 1879; (2) *Coelodepas bantamense* Hassk. in Pflanzenr. **63** (iv. 147. vii): 269. *fig.* 42. 1914; (3) *Nephrostylus Poilanei* Gagnep. in Lecomte, Fl. Gén. Indo-Chine **5**: 328. *fig.* 37. 1925. One of the characters of *Coelodepas* that will bear closer study is the degree of accrescence of the ♀ calyx, this probably having sectional or subgeneric significance.

Macaranga Thouars

Macaranga Poilanei Gagnep. Bull. Soc. Bot. France **69**: 703. 1922, et in Lecomte, Fl. Gén. Indo-Chine **5**: 448, *fig.* 51, *l.* 1926.

Mallotus Tsiangii Merr. & Chun, Sunyatsenia **1**: 62. 1930; Chun, Ic. Pl. Sin. **4**: 12. *pl.* 162. 1935. Syn. Nov.

The material in our herbarium is ample to establish that only one entity is involved under these two binomials. The range of *M. Poilanei* as now known includes Kwangtung, Hainan, Tonkin and Northern Annam.

Macaranga trigonostemonoides sp. nov.

Frutex ad 2 metr. altus, innovationibus hispide puberulis, sordide brunneis. Foliis 8–5 cm. longis, 3–1.75 cm. latis, elliptico-lanceolatis, apice breviter cuspidato-caudatis, basi cuneato-rotundatis, praeter venas hispidopuberulas vel glabratas glabris, margine obscure crenatis, glandula e vena in crena quave sessili, venis optime penninerviis, utrinque ca. 6-jugis, limbo ad basim glandulis pustulosis marginalibus 2–4 notato, subtus minute atroglanduloso; petiolo puberulo 1.5–2 cm. longo. Inflorescentia ♀: axi lentiusculo, sat rigido velutinoso, ad 10–12 cm. longo, flores plures (5–8) quorum 1 saepius apicalem ferente; bracteis floralibus foliaceis ovatis vel ovato-cuspidatis, sessilibus, margine obscure serratis, ceraceo-glandulosis, 1–1.5 cm. longis, 0.7–1.10 cm. latis; perianthio 3 mm. lato, saepius 4-lobo, ovario 2 mm. longo, 3 mm. lato processibus glabris carnosulis ad costam coccorum parcius obsito, caeterum crustaceo-glanduloso sublevi, pedicello ad 2 mm. longo, stylis vix papillosis, 1.2–1.5 cm. longis haud involutis.

INDO-CHINA: Taai Wong Mo Shan and vicinity, near the Kwangtung border, Tsang 29230, June 1939, fairly common in thickets on sandy soil.

Although this new species resembles *M. Poilanei* Gagnep., *M. bracteata* Merr., and *M. Esquirolii* Rehd., it is manifestly different from these three species. Tsang 30351, 29368 belong here; Tsang 29191, 29543, which are only ♂, probably belong here.

Macaranga rosuliflora sp. nov.

Frutex videtur. Ramulis strictis, glabris, rubescentibus, sub apicibus ceraceo-glandulosis, setaceo-stipulosis. Foliis 9–3 cm. longis, 5–1 cm. latis,

elliptico-lanceolatis, apice longiuscule acuminatis, basi subcuneatis levissime auriculatis, venis late adscendentibus utrinque ca. 7-jugis, glabris vel glabris, margine subintegro, limbo subtus minutissime glandulis luteis obsito. Inflorescentia ♂ : rachide gracillimo spiciformi ad 5 cm. longo; bracteis squamulosis integris triangularibus vix 1 mm. longis, quave perianthia 3–4 axillante; perianthio minimo ca. 3 mm. lato, staminibus ad 15. Inflorescentia ♀ : pedunculo alari elongato, 4–8 cm. longo, apice verticillatim 3–4-bracteato, florem unicum apicalem (videtur) ferente; bracteis foliis omnino similibus at minoribus 1–2 cm. longis, 3–6 mm. latis; calycis lobis sub fructu lineari-lanceolatis ad 2 mm. longis; capsula submatura vix 7–8 mm. lata glandulis ceraceis detergibilibus exceptis levi, coccis 2 subdivergentibus inde fructu primo intuitu nempe subbicorni gibboso; semine globuloso 3.5 mm. magno, arillodio striato, hilo magno.

INDO-CHINA: Sai Wong Mo Shan (Sai Vong Mo Leng), near the Indo China-Kwangtung border, *Tsang* 30591, May–December 1940.

The characters of the holotype of this species may not be found to match exactly those of the majority of the specimens. There is an indication in the material seen that plants which are prevailingly ♂ have only small or very small bracts on their ♀ axes. *Tsang* 30591 is almost wholly ♀, and this may account for the large foliaceous bracts which it exhibits in the fruiting stage. It is likely, consequently, that *M. rosuliflora* is represented by the following additional numbers having small bracts: *Henry* 12143; *Tsang* 22049, 22428, 22681, 23814, 24213; *Liang* 69601, 70157; *Teng* 90803 from Yunnan, Kwangsi, Kweichow and Kwangtung. The majority of these collections have been determined as *Mallotus Tsiangii* Merr. & Chun, which is a synonym of *M. Poilanei* Gagnep. A specimen from Pierre's herbarium [a fragment available here], credited to "Masters, Assam" and labelled *Macaranga digyna* Muell.-Arg., suggests this new species and may in fact belong to it. It hardly belongs to *M. digyna*, to judge from Wight's illustration (Ic. Pl. Ind. Orient. 5: pl. 1884. 1852).

Epiprinus Griffith

(*Symphyllia* Baill., *Adenochlaena* auct. non Baill.)

The following specimens are available to me: (1) *Griffith*, Malacca, isotype of *Epiprinus malayanus* Griff.; (2) *Thomson* "Claoxylon 14," isotype of *Symphyllia mallotiformis* Muell.-Arg.; (3) *Griffith* 4913, isotype of *Symphyllia siletiana* Baill. & *trichantha* Muell.-Arg.; (4) *Thwaites* 2111 (a fragment), holotype of *Centrostylis zeylanica* Baill. in herb. Paris; (5) *Balansa* 3246, isotype of *Epiprinus Balansae* Gagnep.

This material shows that *Centrostylis*, treated by many authors as congeneric with *Adenochlaena*, is not congeneric with *Epiprinus*. This material proves, likewise, that *Symphyllia* and *Epiprinus* are congeneric. The differences separating *E. malayanus* and *S. siletiana* are: (1) the number of the stamens, this being 8–10 in *E. malayanus* and not over 4–5 in *S. siletiana* and its group; (2) the degree of accrescence of the ♀ calyx, which is greater in *E. malayanus* than in *S. siletiana* and its group. It is worthy of note, however, that *E. malayanus* is a larger and coarser plant than *S. siletiana* and the species in its affinity.

Since *E. Balansae* is intermediate in its characters between *Epiprinus* and *Symphyllia* and these two entities are otherwise closely related, I propose the following disposition:

Epiprinus Griff. Notul. Pl. As. **4**: 487–489. 1854; Muell.-Arg. in DC. Prodr. **15**(2): 1024. 1866; Hook. f. Fl. Brit. Ind. **5**: 463. 1888; Pax & Hoffm. Pflanzenr. **68** (iv. 147. ix–xi): 109. 1919, et in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. **19**(c): 148. 1931.

Symphyllia Baill. Etud. Gén. Euphorb. 473. pl. 11. fig. 6–7. 1858; Muell.-Arg. in DC. Prodr. **15**(2): 763. 1866; Pax & Hoffm. Pflanzenr. **44** (iv. 147. ii): 15. 1910, et in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, **19**(c): 123. 1931. Syn. Nov.

Adenochlaena Baill. sect. *Symphyllia* Hook. f. Fl. Brit. Ind. **5**: 418. 1887.

(1) **Epiprinus** subg. **Euepiprinus** subg. nov.

Calyce ♀ accrescenti, fructu sat magno, foliis majusculis distinguitur. Species typica: *E. malayanus* Griff.

(2) **Epiprinus** subg. **Symphyllia** (Baill.) subg. nov.

Calyce ♀ vix accrescenti, fructu nec ultra 1–1.5 cm. magno, foliis minoribus dignoscitur. Species typica: *E. siletianus* (Baill.) Croiz.

Epiprinus mallotiformis (Muell.-Arg.) comb. nov.

Symphyllia mallotiformis Muell.-Arg. Linnaea **34**: 156. 1865, et in DC. Prodr. **15**(2): 764. 1866; Pax & Hoffm. Pflanzenr. **44** (iv. 147. ii): 15. 1910; Gamble, Fl. Presid. Madras **2**: 1323. 1925.

Adenochlaena indica Bedd. ex Hook. f. Fl. Brit. Ind. **5**: 418. 1887. Syn. Nov.

Much more delicate in all its parts than *E. malayanus*. The stamens are 4, not 8 as in that species. Apparently restricted to the Deccan.

Epiprinus siletianus (Baill.) comb. nov.

Symphyllia siletiana Baill. Etud. Gén. Euphorb. 474. 1858; Muell.-Arg. in DC. Prodr. **15**(2): 764. 1866 [*Silhetiana*]; Kurz For. Fl. Brit. Burma 378. 1877 [*Silhetana*].

Adenochlaena silhetiana Hook. f. Fl. Brit. Ind. **5**: 418. 1887.

Two specimens from Yunnan, S. W. China, which have been referred by Merrill to *Homonoia* as probably representing *H. symphylliaefolia* Kurz (Lign. Jour. Sc. **19**(2): 188. 1940) appear to belong here. They are: *Henry 13161* and *Wang 77905*. Another unreported collection is *Wang 80117*, from the same Province. It is possible that *E. hainanensis* Croiz. from Hainan is scarcely better than a variety of *E. siletianus*. *Homonoia* does not belong in the same affinity with *Epiprinus*; branched stamens occur in certain species of *Macaranga*, for instance, *M. Daveyi*.

Epiprinus lanceifolius sp. nov.

Arbor vel frutex. Innovationibus parcissime stellato-tomentulosis mox glabratiss. Foliis 17–9 cm. longis, 5–2.5 cm. latis, exquisite elliptico-lanceolatis, apice caudato-acuminatis interdum subfalcatis, glaberrimis, supra nitidis, venis utrinque ca. 7–11-jugis, patentibus, trabeculis manifestis, margine laminae integro, basi glandulis 2 obscurissimis maculato; petiolo apice incrassato, ibique interdum more *Alchorneae* ssp. stipellato, glabro, 0.3–1.5 cm. longo. Inflorescentiis secus cymas spicatas lentas in glomerulis confertis dispositis, ♂ tantum visis, axi tomentello, pallide luteo. Perianthio subsessili, basi interdum glandulifero, ca. 3 mm. lato, 2 mm. longo, lobis 4 integerrimis, habitu cochleatis, ad 1.25 mm. longis, staminibus 4; pistillodio columnari, sat evoluto, ad 1 mm. longo, apice irregulariter apiculato-incrassato.

INDO-CHINA: Tonkin, Pho Ho, *Du Pasquier* 3060 [*Pételot*], 1927.

A strong species with all the floral characters of the genus. It is allied to *E. Poilanei* Gagnep., but is unlike it in its foliage and inflorescence.

Trigonostemon Blume

Trigonostemon asahanensis sp. nov.

Arbor. Innovationibus glabratiss, pilis tantum setaceis brevibus sparsis onustis, citissime griseo-corticatis. Foliis 15–7 cm. longis, 6–3 cm. latis in sicco atris, glabris, firme chartaceis, ellipticis, apice plus minusve acutato-cuspidatis, basi cuneatis, margine grosse repandulo-serratis, venis conspicuis patentibus ca. 8–12-jugis; petiolo glabro, eglanduloso 1–1.5 cm. longo. Floribus ♂ (mancis) parvis, sepalis 5, latissime imbricativis, 3 mm. longis, 2 mm. latis, exterioribus plus minusve petaloideis in pedicellum ipsum abeuntibus, interioribus optime petaloideis, (videtur) albicantibus basi tantum incrassatis, coloratis; petalis 5, ovato-rotundatis, albidis; staminibus ca. 10, (videtur) in pulvinulum aggregatis, pistillodio nullo, columna staminali nulla. Floribus ♀ 10–13 mm. latis, singulis vel in racemulos oligofloros laterales congestis, pedicello 1.5–2 cm. longo, sepalis 5 obovatis, minutissime setulosis vel glabratiss, margine integris anthesi peracta haud accrescentibus, 3 mm. longis, 2 mm. latis, petalis 5 cum sepalis alternatibus, obovatis, 5–6 mm. longis, ca. 4 mm. latis; ovario glaberrimo, atro, ad 3–4 mm. magno, grosse verrucoso-papillato, stylis 3 profunde partitis ca. 4 mm. longis, disco vix 0.5 mm. alto subintegro.

SUMATRA: Asahan, vicinity of Tomoean Dolok, alt. ca. 1000 m., *Rahmat Si Boeea* 9872 TYPE, Aug. 1939.

Two other specimens from the same Province belong here: *Rahmat Si Boeea* 9431, Tor Matoetoeng, 1792 m. alt., July 1936 (used to describe the ♂ flower); *Rahmat Si Boeea* 9567 [2 sheets], vicinity of Aek Salabat, northeast of Tomoean Dolok, ca. 450 m. alt., July 1936.

I am not sure that *Trigonostemon* is the genus for this species. It suggests *Dimorphocalyx* Thw. in every respect, but the sepals of the ♀ flower are not accrescent, which is believed to be the only character that separates *Dimorphocalyx* from *Trigonostemon*. The genera in this vicinity require critical attention, and a final disposition of this new species must await the collection of fruiting material and a general revision of the *Trigonostemon* alliance.

ARNOLD ARBORETUM,

• HARVARD UNIVERSITY.

STUDIES OF THE ICACINACEAE, II
HUMIRIANTHERA, LERETIA, MAPPIA AND NOTHAPODYTES,
VALID GENERA OF THE ICACINEAE

RICHARD A. HOWARD

With four plates

THE four genera considered here have been treated at various times and by various authors as one. They belong to that general group of the Icachineae having free petals which are pilose on the inside. This contribution is an attempt to clarify the problem by redefining the genera and by incorporating new lines of evidence taken from studies of the wood, pollen and fruits.

Humirianthera is a distinct genus. The limits of the remaining genera have been drawn in various manners. Baillon (*Adansonia* **3**: 367. 1862-3) considered them all as synonymous with *Ikacina*. Bentham and Hooker (*Gen. Pl.* **1**: 351. 1862), Engler (*Mart. Fl. Bras.* **12**(2): 50. 1872) and House (*Amer. Midl. Nat.* **8**: 62. 1922) have considered them under either *Mappia* or *Leretia*. In Baehni's recent monograph the *Mappia* complex has been divided. The Old World species were placed in the newly proposed genus *Neoleretia* while the New World species were retained in the emended genus *Mappia*. Baehni acknowledged *Mappia* of Jacquin to be an invalid name; however, since its predecessors are also invalid, he proposed the name be added to the list of *nomina conservanda*. Baehni, however, misinterpreted the genus *Nothapodytes* Blume, which other workers have shown to be made up of the Asiatic species of "*Mappia*." Recently, Sleumer (*Notizbl.* **15**: 247. 1940) has rejected Baehni's genus *Neoleretia* and transferred most of the species to *Nothapodytes*. This appears to be the correct procedure. Applying strict priority Sleumer also rejected the name *Mappia* Jacq. as a later homonym and took up the name *Leretia* Vell. for the American species. Before his paper appeared, the name *Mappia* Jacq. had been published in the official supplementary list of additions to the *nomina conservanda* in the Kew Bull. for July 1940.

Baehni and Sleumer have placed all the New World species of the *Mappia* complex in one genus. With this I do not agree. At least *Leretia cordata* (including *L. Vellozii*, *L. nitida*, and *L. Poeppigiana*) cannot belong in the genus *Mappia*, as differences are found in the wood, pollen grains, fruits, and centers of distribution.

The segregation of the *Mappia* complex accepted here is not new. Miers (*Ann. Mag. Nat. Hist.* II. **9**: 392. 1852) and Engler (*Nat. Pflanzenfam.* III. **5**: 249. 1893) have both considered *Mappia* and *Leretia* distinct. Baehni has pointed out the differences between the Old and New World

groups. There has been, however, no critical comparison of these genera and no attempt to tabulate their differences. This I have supplied in the present paper.

A complete synonymy and history of the group was given in Baehni's work.

Survey of the diagnostic generic characters

Leretia Vellozo

Lianas; inflorescent axillary; pedicels bracteate; calyx lobed; filaments arcuate, attached dorsally, connective linear, usually extended beyond the anther sacs to an inconspicuous tip; pistil usually with two abortive styles, ovary with a glabrous columniform base, pubescent in the locule, disk absent; fruit large, mesocarp thin and dry, putamen thin, pubescent inside, funicle in a tubular canal in the putamen; cotyledons folded, wrinkled, not displaced laterally, their margins superimposed.

Mappia Jacquin

Trees; inflorescence axillary; pedicels ebracteate; leaves commonly with dorsally axillary pores; calyx toothed; filaments attached to the base of the connective; pistil symmetrical, disk fleshy foliaceous; fruit with fleshy mesocarp, endocarp moderately thick, funicle in the mesocarp; cotyledons flat, not displaced laterally, their margins superimposed.

Nothapodytes Blume

Trees; inflorescence terminal; pedicels ebracteate; calyx toothed; filaments attached dorsally to the connective and fused with a cushion formed of apparently reflexed basal lobes of the anther sacs; pistil symmetrical, disk fleshy foliaceous; fruit with fleshy mesocarp, putamen thin, funicle in the mesocarp; cotyledons flat, laterally displaced, their margins not superimposed.

Humirianthera Ducke

Lianas; inflorescence terminal or falsely lateral; pedicels bracteate; calyx deeply lobed; filaments attached dorsally, connective triangular, extended beyond the globose anther sacs to a tapering apex; pistil with an acentric style, disk lacking; fruit large with a thick woody putamen, funicle in a tubular canal; cotyledons frequently folded, not displaced laterally, their margins superimposed.

Of these four genera *Humirianthera* is the most distinct. In their treatments of the other genera of the *Mappia* complex, previous workers have placed too much emphasis on the form and pubescence of the calyx. A study of considerable material shows that the characters that have been emphasized are extremely variable. There are, however, reliable differences in the stamens which have been overlooked. The differences in the method of attachment of the filaments and anthers are of value in readily distinguishing the genera. In *Nothapodytes* the connective is short, so that the filament appears to be attached near the middle of the anther. Furthermore, the extension of the anther sac tissue in a reflexed basal lobe is unusual and quite diagnostic. Elongation of the filament before the flower opens causes it to arch behind the anther while the basal portion of the filament remains strict. *Mappia* and *Leretia* are quite in contrast to this. *Mappia* has the filament attached basally to the connective and there is no

arching of the filament. Here elongation in bud condition causes contortion of the filament below the anther. The filaments of *Leretia* are more slender and are attached dorsally to a linear connective which commonly projects beyond the anther sacs in a small tip. Elongation of the filaments in *Leretia* produces an abaxial arching similar to that found in *Nothapodytes*.

The pistil in *Mappia* and *Nothapodytes* has a terminal style and is quite symmetrical. In *Leretia* the pistil is asymmetrical with a slightly acentric style. Frequently two papillae or presumably rudimentary styles are present. A fleshy foliaceous disk subtends the ovary in *Nothapodytes* and in *Mappia*. *Leretia* has a columniform, at times hairy, base to the pistil and some authors have called this a "disk." *Leretia* also differs from the other genera by having long tangled hairs on the inside of the locule. These are present in the mature fruit as long sparse smooth-walled usually straight hairs. These hairs are not present in *Mappia* and *Nothapodytes*.

The fruit of the Icacinaceae is typically a drupe with a sclerified putamen. In each cell only one pendant anatropous seed is developed from the two ovules. In the genera of the family having the liana habit, generally speaking, the funicle is enclosed in the putamen. In the other genera of the family, the funicle may lie between two projecting ridges of the putamen in mesocarp tissue or it may lie free in the mesocarp. In all the specimens of *Leretia* that I have examined, the funicle travels up the putamen in a special tubular canal until near the apex, where it enters the locule. In *Mappia* and *Nothapodytes* the funicle, in the material I have studied, is never enclosed in the putamen, although two projecting ridges lateral to it may be developed. The funicle may, however, enter the putamen and travel in a tubular canal a short distance before making an abrupt turn and entering the locule. Whether enclosed in the putamen or free in the mesocarp, the funicle lies on the margin in those fruits that are slightly flattened. In contrast to this, the raphe is always found on the broad face of the seed. In other words, an adjustment of 90° exists between the position of the funicle and the raphe. The raphe is generally strap-shaped and terminates in a flattened circular chalaza at the end of the seed opposite the micropyle. This is true of all genera of the family in which the fruits have been studied.

The axillary inflorescences found in *Mappia* and *Leretia* distinguish these genera from *Nothapodytes*, in which the inflorescence is terminal. The flowers are articulated to the pedicels immediately below the calyx in all genera of the *Mappia* complex. *Leretia* differs from *Nothapodytes* and *Mappia*, however, by having small bracts at the top of the pedicel. *Nothapodytes* and *Mappia* are without bracts.

The pores in the axils of the veins and midrib on the lower surface of the leaves of several species of *Mappia* have been mentioned by previous workers. These appear to be quite similar to those found in some of the South American species of *Citronella* (Howard, Jour. Arnold Arb. **21**: 478. 1940). I have not been able to find mites in these, as are so commonly found in *Citronella*. Likewise, in *Mappia* the pores are without internal hairs.

The specimens used in this study and cited in this current paper are from the herbaria of the Arnold Arboretum (A); Field Museum of Natural History (FM); Gray Herbarium (G); New York Botanical Garden (NY); Atkins Institution of the Arnold Arboretum, Soledad, Cuba (So); and the United States National Museum (US).

Leretia Vellozo

Leretia Vellozo, Fl. Flum. 99. 1825, Fl. Flum. Ic. **3**: t. 2. 1827; Bentham, Trans. Linn. Soc. **18**: 680. 1838; Miers, Ann. Mag. Nat. Hist. II. **9**: 392. 1852, III. **4**: 364. 1859; Valetton, Crit. Overz. Olac. 184. 1886; Engl. Nat. Pflanzenfam. III. **5**: 250. 1893.

Lianas (or shrubs and small trees with eventually scandent branches), lenticels inconspicuous; leaves alternate, short-petioled, the petioles shallowly canaliculate, the margins entire, slightly revolute; inflorescences axillary much-branched cymes or panicles, pedunculate; flowers articulated to short bracteate pedicels, perfect or rarely unisexual by abortion, the five calyx lobes subacute to rounded; petals (4–)5, free, valvate with inflexed tips; stamens (4–)5, free, filaments filiform, arcuately attached dorsally, the connective extended into an inconspicuous tip, the anthers oblong, introrse, longitudinally dehiscent; pistil asymmetrical usually with two abortive styles, functional style glabrous, the stigma capitate, the ovary hirsute with a columniform base which is also frequently hirsute, one-celled; ovules two, pendant from the apex, anatropous; fruit drupaceous, glabrate, ovoid-ellipsoid, slightly flattened, apex obliquely umbonate, mesocarp scarcely fleshy, the putamen tenuous, smooth; seed one, albuminous, the embryo with wrinkled cotyledons which are not displaced but have their margins superimposed.

TYPE SPECIES: *Leretia cordata* Vell.

DISTRIBUTION: Brazil, British Guiana, and Peru.

Leretia cordata Vell. Fl. Flum. 99. 1825.

Leretia Vellozii Miers, Ann. Mag. Nat. Hist. II. **9**: 392. 1852, III. **4**: 364. 1859.

Leretia nitida Miers, Ann. Mag. Nat. Hist. III. **4**: 365. 1859.

Mappia cordata Engl. in Mart. Fl. Bras. **12**(2): 50. 1872.

Mappia nitida Engl. in Mart. Fl. Bras. **12**(2): 51. 1872.

Mappia Poeppigiana Baill. Adansonia **11**: 175. 1874.

Icacina (?) *Poeppigiana* Valetton, Crit. Overz. Olac. 187. 1886.

Leretia Poeppigiana Sleumer, Notizbl. **15**: 245. 1940.

Branches terete to angular, red-brown in color, appressed short-strigose-pubescent, becoming glabrate, the older branches with dark brown corky bark; leaves alternate, petioles stout, commonly twisted, 0.8–1.5 cm. long, densely chestnut strigose-pubescent below, becoming glabrate, corky at maturity; lamina ovate-lanceolate to oblong or elliptic, 10–19 cm., rarely 30 cm. long, 4–12 cm. broad, apex acute with an apiculate point to rounded or obtuse, base acute or rounded, dark green above and frequently shining, commonly lighter below, the upper surface sparsely short white pilose-pubescent, soon becoming glabrate, lower surface commonly with white or yellowish malpighiaceous hairs with almost equal arms, rarely with weak stellate clusters of pilose hairs, midrib prominent, stout, strigose-pubescent, sulcate above, the veins 6–8 on each side, prominent, gracefully arcuate, anastomosing near margin to form a complex reticulum, with numerous

less prominent interpolated veins; inflorescence to 18 cm. long and 10 cm. wide, the peduncles and pedicels densely golden strigose-pubescent, the pedicels 2–4 mm. long, bracteate, the bracts ovate, acute, strigose-pubescent; calyx 2 mm. in diameter, patelliform, lobes or teeth 0.5–0.8 mm. high, densely golden hirsute or strigose; petals lanceolate-ovate or oblong, 2.5–3.4 mm. long by 1.5–2 mm. broad in bud, 4.8–5.5 mm. long and 1.8–2 mm. broad at maturity, the midrib moderately well developed, densely hirsute outside, inside long-pilose or tomentose, the inflexed apex glabrous; stamens 4–4.5 mm. long, the anthers 0.7–1 mm. long; ovary 1.5 mm. in diameter at anthesis, the locule densely hirsute or tomentose inside, the functional style 2–2.5 mm. long, the rudimentary styles rarely exceeding 0.3 mm. in length; fruit 3.5–4.5 cm. long, 2–2.5 cm. wide and 1.5–2 cm. thick, the base acute or tapering, the apex acute, hirsute when young but glabrate at maturity, the putamen papery, scarcely woody, sparsely pubescent inside with long pilose hairs; seed pendant from near the apex, to 2.5 cm. long, 1.5 cm. wide, 1 cm. thick, the raphe traveling obliquely down the seed to a circular chalaza near the base, the embryo one-half to two-thirds the length of the seed, to 1.3 mm. long, the cotyledons oval to obovate, to 1 cm. wide, apex rounded, venation rapidly dichotomizing at base, the radicle minute, 1 mm. long, cylindric.

TYPE LOCALITY: Pará, Brazil.

ILLUSTRATIONS: Vellozo, Fl. Flum. Ic. **3**: t. 2, 1827; Miers, Contrib. **1**: t. 7, as *L. Vellozii*, 1851–61; Engl. in Mart. Fl. Bras. **12**(2): t. 11, as *L. nitida*, 1872; Valeten, Crit. Overz. Olac. pl. 5, fig. 29, as *L. cordata*, 1886, fig. 30, as *L. nitida*, 1886; Engl. Nat. Pflanzenfam. III. **5**: fig. 139, D–F, as *L. nitida*, 1893; Baehni, Candollea **7**: pl. 4, fig. 1, A–B, as *M. cordata*; fig. 1, C, as *M. Poeppigiana*, 1936.

DISTRIBUTION: Brazil, British Guiana, Peru.

BRAZIL: Amazonas: Near mouth of Rio Embira, *Krukoff 5021* (A, NY); Bahia: *Blanchet 2347* (FM); Pará: Boa Vista on Tapajos River, *Dahlgren and Sella 158* (FM). BRITISH GUIANA: Northwest slopes of Kanuku Mts., drainage of Moku-moku creek, *Smith 3591* (G, NY); Kamakusa, upper Mazaruni river, *La Cruz 4235* (FM, G, NY, US); Waini river, Northwest district, *La Cruz 3794* (NY). PERU: Loreto: Puerto Arturo, lower Río Huallaga, *Killip and Smith 27869* (FM, NY, US); Mishuyacu, near Iquitos, *Klug 345* (FM, US), *Klug 641* (FM, NY, US), *Klug 666* (FM, NY, US), *Klug 1215* (NY); Balsapuerto, *Klug 2967* (A, FM, G, NY, US); Caballo-Cocha, *Williams 2067* (FM), *Williams 2055* (FM, US), *Williams 2084* (FM); Iquitos, *Williams 3541* (FM); San Martín: Tarapoto, *Spruce 4492* (FM photo, NY); Juan Jui, Río Huallaga, *Klug 3892* (FM, G, NY, US); Tarapoto, *Williams 6042* (FM, US); Maynas, *Poeppig 2329* (FM photo). Peru-Columbia boundary: Río Putumayo, *Klug 1633* (A, FM, G, NY, US).

NATIVE NAME: Puca yacu (Williams).

As Baehni points out, there are no significant differences between *L. nitida* and *L. cordata*, and they must be considered as identical. However, Baehni does distinguish between *M. cordata* and *M. Poeppigiana* on the shape of the leaf; the base being acute in the former and not acute in the latter. I have been able to examine more material than he cites and find that this distinction, along with that of the size of the leaf, is not a consistent one. The plants are lianas or small trees with scandent branches and, as such, one might expect the enormous leaf variation that is present. The range of leaf size and shape claimed for the species which have been proposed can be found in a single collection (*Klug 2967* or *Krukoff 5021*) and frequently

on a single sheet (*Smith 3591*, NY). In these, the mature leaves may vary from 10 to 28 cm. in length and the base from acuminate to rounded or subcordate. For this reason I also place *M. Poeppigiana* in the synonymy of *L. cordata*. The other name, *L. Vellozii*, was supplied by Miers when he considered the epithet *cordata* to be inappropriate.

In Baillon's original description of *M. Poeppigiana* he cites the flowers as being polygamous. In most of the specimens that I have seen the flowers are perfect; however, there is a strong tendency for reduction of the pistil to a condition where there are three almost uniform styles. When this occurs the stamens are usually stouter and the pollen very abundant in the anthers. On the other hand, certain flowers show a tendency to reduce the stamens to poorly developed structures with very little pollen in the anther sacs. In these instances, the pistil usually has one well developed style with two rudiments scarcely evident.

Some of the previous monographers of this genus have interpreted the glabrous cylindrical or columniform base that is frequently present on the ovary as a disk and have considered it comparable to that found in *Mappia*. Examination of considerable material easily shows that such is not the case. The tissue of this base is not distinguishable from the rest of the ovary and very commonly is reduced in size and is scarcely evident.

The occurrence of hairs in the locules of this genus is unusual among the fruits of this family. I have found them only in *Ottoschulzia* among other genera. In the flowering condition the hairs are widely separated, long, and usually straight. The walls of these hairs are smooth and quite thick and their bases are usually enlarged.

Species Excluded

Lereticia glabrata Sleumer, Notizbl. **15**: 245. 1940 probably = **Pleurisanthes parviflora** (Ducke) Howard.

Sleumer compares his new species with *L. parviflora*, which I had previously referred to the genus *Pleurisanthes*. It seems strange that Sleumer did not recognize this relationship, since he also described a new species of *Pleurisanthes*. Nevertheless *L. glabrata*, according to Sleumer's description, does not have the characters of the genus *Mappia* (*Lereticia* sensu Sleumer), as the pedicels are bracteate and the petals are glabrous within. Sleumer does not mention a foliaceous disk, nor does he describe an articulation below the calyx, both of which are also characteristic of *Mappia*.

From the description given I cannot distinguish *L. glabrata* from *Pleurisanthes parviflora* and so, until I can examine the type, I tentatively refer Sleumer's species to the synonymy of *Pleurisanthes parviflora*.

Lereticia paniculata Mart. Fl. Bras. **7**: 17. 1856 -- **Citronella paniculata** (Mart.) Howard, Jour. Arnold Arb. **21**: 473. 1940.

L. retia parviflora Ducke, Arch. Jard. Bot. Rio **4**: 119. 1925 = **Pleurisanthes parviflora** (Ducke) Howard, Jour. Arnold Arb. **21**: 482. 1940.

Mappia Jacquin

Mappia Jacquin, Hort. Schoenbr. **1**: 22, t. 47. 1797; Kew Bull. **1940**: 111. 1940, as *nomen conservandum*; Miers, Ann. Mag. Nat. Hist. II. **9**: 393, in part. 1852;

Contrib. **1**: 62, in part. 1851-61; Baillon, *Adansonia* **3**: 367. 1862-3; Hist. Pl. **5**: 328, in part. 1874; Engl. Nat. Pflanzenfam. III. **5**: 249. 1893; Baehni, Compt. Rend. Soc. Phys. Hist. Nat. Genève **53**(1): 33. 1936; Candollea **7**: 171, in part. 1936.

Trees and shrubs; branches terete; leaves alternate, petiolate, the petioles shallowly sulcate, the lamina entire, the margin slightly revolute, commonly with pores in the axils of the veins on the dorsal surface; inflorescence axillary, cymose or corymbose, the flowers articulated to short ebracteate pedicels; flowers perfect, 5-parted, the calyx patelliform, minutely toothed; petals valvate, strigose or glabrate outside, villose inside, inflexed apex short, glabrous; stamens free, the anther sacs oblong, longitudinally dehiscent, introrse, filament basally attached, not arcuate, filiform, fleshy, scarcely flattened; pistil symmetrical, the ovary hirsute or glabrous, the disk fleshy, hirsute or glabrous on the margin and inside but always glabrous outside, the ovary one-celled; ovules two, anatropous, pendant from the apex of the locule; drupe with a thin putamen, seed one, albuminous, the cotyledons not displaced laterally, their margins superimposed.

TYPE SPECIES: *Mappia racemosa* Jacq.

DISTRIBUTION: Greater Antilles, Mexico, Panama.

Key to the species

Ovary and disk glabrous; petals glabrous outside; inflorescence to two-thirds the length of the oblanceolate leaves *M. mexicana*

Ovary at least sparsely pubescent; petals pubescent outside at least at the apex.

Leaves narrowly lanceolate, without pores in the axils of the veins on the lower leaf surface; petals lanceolate; disk glabrous; pistil densely hirsute. . . *M. angustifolia*

Leaves broadly lanceolate or oblanceolate; pores present in the axils of veins; petals oblong; disk densely hirsute inside and on the margins or glabrate; pistil densely hirsute to glabrous *M. racemosa*

Mappia mexicana Robins. & Greenm. Amer. Jour. Sci. III. **50**: 150. 1895; Standley, Contr. U. S. Nat. Herb. **23**: 689. 1923; Baehni, Candollea **7**: 176. 1936.

Leretia mexicana Sleumer, Notizbl. **15**: 245. 1940.

Shrub 1.5-3 m. in height; branches terete, youngest stems sparsely pilose; petioles 5-8 mm. long, strigose to pilose, densely so in the sulca; lamina subcoriaceous, oblanceolate or oblong-obovate, 7.5-10.5 cm. long, 1.5-3.5 cm. broad, short-acuminate to rounded or obtuse at apex, cuneate at base, glabrous and shining above, when young sparsely pilose below at least towards base and becoming glabrate, the veins 6-7 pairs, weakly developed, slightly arcuate, anastomosing at margins; inflorescence with peduncles 2-6 cm. long, sparsely pilose, with several strigose bracts on the lower portion, the corymbs many-flowered, 2-3 cm. in diameter, the pedicels 1-2 mm. long, frequently glabrous, ebracteate, the calyx sparsely strigose or frequently glabrous, minutely toothed; petals moderately fleshy, oblong, 3-3.2 mm. long, 1-1.2 mm. broad at maturity, glabrous without, glabrate within or sparsely villose, the inflexed apex very short; stamens 2.5-3 mm. long, the anthers oblong, 1-1.2 mm. long, the anther sacs parallel, the filaments slightly flattened, the connective frequently extended to an inconspicuous tip; pistil 2 mm. in diameter at anthesis, glabrous, the style scarcely evident, the stigma capitate, the disk fleshy, 5-lobed, glabrous; fruit ovoid or ellipsoid, 1-5 cm. long, 1 cm. wide and 0.7 cm. thick, slightly flattened, apex slightly umbonate, base rounded or truncate, the funicle in the mesocarp, crescent-shaped in section; seed 1 cm. long, 0.7 cm. wide and

0.5 cm. thick, the raphe strap-shaped, the embryo three-quarters the length of the seed, the cotyledons ovate, 5 mm. long, the radicle cylindrical, 2 mm. long.

TYPE LOCALITY: Micos, San Luis Potosí, Mexico.

ILLUSTRATION: Plate I.

DISTRIBUTION: Mexico.

MEXICO: San Luis Potosí: Micos, *Pringle* 5094 (A, G); Tamaulipas: Tampico, *Pringle* 6645 (A, G, NY, US), *Palmer* 69 (US).

Robinson and Greenman based their species on a specimen cited "*Pringle* 5494." Baehni also cites this number as examined. Miss Davis cited that number as *Inga laurina* Willd. and this has been verified in the Gray Herbarium. The specimen of *Mappia mexicana* in the Gray Herbarium, which is presumably the type, bears the number 5094 and is listed as such by Davis (Life and Work of C. G. Pringle 547, 1936).

Superficially the two Pringle collections examined are strikingly different in leaf shape and the length of the peduncle. In addition, *Pringle* 6645 has the inner surface of the petals persistently pubescent while *Pringle* 5094 is glabrate. The petals are fleshy in both and frequently have a waxy outer surface. They commonly turn blue on drying. The stamens are unique in that frequently the anther sacs will drop off after maturing, so that the old flowers will have erect filaments and connectives with no indications of the anther sacs. The connective is longer than that of most species of *Mappia* and frequently extends to a small apex or point beyond the anther sacs; it is narrow and scarcely separates them. The filament is attached, slightly abaxially, to the base of the connective. The description of the fruit was compiled from the Palmer collection.

Baehni saw in this species a close relationship with the Old World species of *Nothapodytes*. However, more complete study shows its true relationship is with *Mappia racemosa* of the Antilles.

Mappia angustifolia Griseb. Cat. Pl. Cub. 119, 1866.

Leretia angustifolia House, Amer. Midl. Nat. 8: 62, 1922.

Shrub, the branches pubescent; petioles 0.8–1.2 cm. long, strigose, densely so in the sulca; lamina narrowly lanceolate, 7–11 cm. long, 1.2–1.5 cm. broad, attenuate at both ends, apex rounded, base cuneate, chartaceous, glabrous and shining above, sparsely pubescent below with malpighiaceous hairs with unequal arms, the midrib prominent, strigose, the veins very weakly developed, arching, anastomosing towards margin, without axillary pores; inflorescence 3–4 cm. long, cymose, few-flowered, axis strigose to pilose; calyx patelliform, membranaceous, five-toothed, sparsely pilose; petals lance-oblong, 4–4.2 mm. long, 1 mm. broad at maturity, weakly pilose on the upper third without, villose within, densest on the lower portion, the apex inflexed, glabrous, to 0.8 mm. long; stamens 3–3.2 mm. long at maturity, the anthers 1 mm. long, the anther sacs slightly diverging at base; pistil 2 mm. high at anthesis, the ovary densely hirsute, the style short, the stigma oblique, capitate, the disk fleshy, five-lobed, glabrous; fruit unknown.

TYPE LOCALITY: Oriente province, Cuba.

ILLUSTRATIONS: Plate II, figs. 1–3.

DISTRIBUTION: Cuba.

CUBA: Oriente: near Saltadera, Sept. 20, 1860, *Wright* 2638 (G).

Wright's collection is the only one I have seen referred to this species. It is easily recognized by its narrow leaves, the absence of axillary pores, the few-flowered inflorescence, and the glabrous ovarian disk. Wright reported the flowers to be a greenish-white color.

Wright and Sauvalle (Fl. Cub. 21. 1873) have placed this species in the synonymy of *M. racemosa*. From a study of this single collection of *M. angustifolia* and a large number of specimens of *M. racemosa* I can only conclude that there are good differences between them.

Mappia racemosa Jacq. Hort. Schoenbr. 1: 22. 1797; Miers, Ann. Mag. Nat. Hist. III. 9: 394. 1852; Griseb. Fl. Brit. West Indies 1: 310. 1860; Fawcett and Rendle, Fl. Jam. 5: 39. 1926; Baehni, Candollea 7: 175. 1936.

Icacina dubia Macf. Fl. Jam. 1: 122. 1837.

Leretia racemosa House, Amer. Midl. Nat. 8: 62. 1922.

Mappia affinis Miers, l.c. 395. 1852; Contrib. 1: 64. 1851-61.

A large bush or tree to 11 m. high, trunk diameter to 30 cm., the branches glabrous, terete or angular; petioles 12-25 mm. long, slightly strigose in the sulca, becoming glabrate; lamina lanceolate, oblanceolate or oblong, 10-19 cm. long, 3-5 cm. broad, apex acuminate to sharp-pointed or rounded, base acute to cuneate, glabrous, thinly coriaceous, dark green, rarely shining above, lighter below, the midrib canaliculate above, prominent below, the veins 7-9 pairs, inconspicuous above, weakly developed below, diverging obliquely, scarcely arcuate except near margin, inconspicuously anastomosing, the axillary pores more or less developed; inflorescence cymose or corymbose, the peduncles one and one-half to several times the length of the petiole, densely pilose to glabrate, bearing several spirally arranged densely hirsute bracts at the base, few- to many-flowered, the pedicels short; calyx patelliform, five-toothed, sparsely strigose with the hairs usually aggregated at the teeth, 1.5-2 mm. in diameter, 0.3-0.8 mm. high; petals lanceolate to oblong, reflexed, 3-4.5 mm. long and 0.9-1.1 mm. broad at maturity, densely strigose to glabrate without, within abundantly pilose or hirsute, the hairs frequently aggregated in the lower third, inflexed apex glabrous; stamens 2.5-4.5 mm. long at maturity, the filament rarely flattened at base, the anthers oblong, 1 mm. long, slightly diverging at base, the connective two-thirds the length of the anther; pistil 2-3 mm. high at anthesis, densely hirsute to glabrate, the stigma capitate, truncate to oblique, frequently bilobed, the style short, glabrous, the disk fleshy, hirsute on the edge and within and glabrous without to glabrate; lobes 0.2-0.3 mm. high; fruit ellipsoid, 1.4-1.6 cm. long, 0.9-1.1 cm. wide, tapering to the base or rounded, apex umbonate, mesocarp moderately fleshy or fibrous, the putamen smooth or slightly rugose; seed to 11 mm. long, the embryo nearly equal to the length of the seed, the cotyledons ovate, strongly palmately trinerved, the radicle short, conical or cylindrical, the endosperm with abundant oil cells.

Key to the varieties

- Fruit 1.7-2.5 cm. long, ellipsoid, tapering at base, mesocarp fibrous, not fleshy; leaves lanceolate, acuminate to a sharp pointed apex; pistil and disk usually glabrous or sparsely pubescent var. *typica*
 Fruit 1.2-1.7 cm. long, globose, base rounded, mesocarp fleshy; leaves oblanceolate, apex rounded or acute with rounded tip; pistil and disk hirsute... var. *brachycarpa*

Mappia racemosa var. **typica** var. nov.

Leaves lanceolate, apex acuminate to a sharp rarely rounded tip; inflorescence at least twice the length of the petiole, sparsely pubescent to glabrate; petals sparsely pubescent without; pistil essentially glabrate, disk usually glabrate; fruit ellipsoid, apex acute with an umbonate tip, base tapering, mesocarp fibrous, not very fleshy.

TYPE LOCALITY: Jamaica.

ILLUSTRATIONS: Jacq. Hort. Schoenbr. 1: t. 47. 1797; Valetton, Crit. Overz. Olac. pl. 5, fig. 25. 1886; Baehni, Candollea 7: pl. 4, fig. 1, D-E. 1936.

DISTRIBUTION: Jamaica, Cuba (Oriente), Porto Rico, Panama (?).

JAMAICA: Green Valley, *Harris* 5387 (US), *Harris* 6511 (FM, NY); Peckham woods, Upper Claredon, *Harris* 11193 (NY); Schwallenburgh, St. Ann, *Harris* 7043 (A, G, NY, US); Grier park, St. Ann, *Alexander* (ex Herb. Prior, NY); Santa Cruz Mts., Stauruane Hills, *Britton* 1304 (NY); without locality, *Hart* 575 (US), *MacFayden* (G). CUBA: Oriente, Josephina, Hiazo, *Wright* 1578¹ (G, US); locality not determined, *Wright* 1389 (NY). PORTO RICO: N. L. and E. G. *Britton* 9911 (NY). PANAMA: Bocas del Toro, region of Almirante, Flat Rock, *Cooper* 563 (FM, NY, US).

Mappia racemosa var. **brachycarpa** Griseb. Cat. Pl. Cub. 119. 1866.

Leretia racemosa (Jacq.) House var. *brachycarpa* (Griseb.) Sleumer, Notizbl. 15: 245. 1940.

Leaves oblanceolate, apex rounded or acute with rounded tip, base cuneate; inflorescence rarely twice the length of the petioles, usually strigose to pilose; petals densely to sparsely strigose without, densely pilose within; pistil densely hirsute, disk hirsute on the margin and frequently so within, rarely sparsely pubescent; fruit globose or slightly flattened, apex rounded and slightly umbonate, base rounded, the mesocarp fleshy.

TYPE LOCALITY: Cuba.

ILLUSTRATIONS: Plate II, figs. 4-13.

DISTRIBUTION: Cuba, Haiti (?).

CUBA: Oriente: *Wright* 1578 (G), Farallon de la Perla, *Wright* 1389 (G, NY), *Shafer* 8770 (NY); Sierra Maestra, *Leon* 10981 (NY). Santa Clara: Guabairo, Soledad, Cienfuegos, *Jack* 6902 (A, NY, So), Buenos Aires, Trinidad Hills, *Jack* 6979 (A, NY, So), *Jack* 7233 (A, So, US), *Jack* 8068 (A, NY, So, US). Havana: Valley Rio Bacuranao, *Wilson and Leon* 11608 (NY); Sierra de Anafe, *Leon* 7575 (NY), *Wilson and Leon* 2849 (NY), *Leon and Roca* 7133 (NY); Managua, *Van Hermann* 1294 (FM); Jamaica, Loma de Somorrostro, *Leon and Roig* 11455 (NY). Pinar del Rio: Sierra de Anafe, *Wilson* 11496 (FM, NY, US), *Wilson and Leon* 11300 (NY, US), *Wilson and Leon* 11547 (NY), *Leon* 2829 (NY); Sierra Mendoza, *Shafer* 11130 (NY); Guanajay, Mt. San Gabriel, *Van Hermann* 250 (FM, NY); Guanajay Mt., *Baker and Van Hermann* 4265 (FM, NY), *Baker and Van Hermann* 4273 (FM, NY). HAITI: Petit-Goave, Chapelle St. Michel, *Ekman* 6602 (US); Gd. Goave, Morne Descassiers, *Ekman* 9535 (US).

Specimens of *Mappia racemosa* exhibit an enormous series of variations in leaf size, shape and texture. Accompanying variation in the pubescence of the ovary and the disk has made attempts to define the limits of this species hazardous. I have available for study material from Cuba, Porto

¹This collection is a mixture. One sheet at the Gray Herbarium bears both var. *typica* and var. *brachycarpa*. The latter has not been recorded from the Oriente in recent collections and it is quite possible that this specimen has been added to the sheet without notation being made of that fact. The collection of *Wright* 1389 must also be a mixture as Grisebach cites this number as the type for var. *brachycarpa*; however, the cited sheet from NY is var. *typica*.

Rico, Jamaica, Haiti, and Panama. The original figure and description by Jacquin was from a cultivated plant whose country of origin was unknown. Baehni and others have concluded it came from Jamaica. MacFayden described an *Ikacina dubia* from Jamaica which Miers reduced to the synonymy of *M. racemosa*. In 1866 Grisebach described a variety, from the collections of Wright from Cuba, on the basis of a character in the fruit. Grisebach had indicated this variety earlier (Pl. Wright. 1:191. 1860), without naming it. The variety is well marked and appears to be the common representative in the numerous recent collections from Cuba. The third name applied here is *Mappia affinis* Miers which was believed distinct, by that botanist, on the absence of axillary pores. These pores are usually present but vary considerably in degree of development. Often they are 3 mm. in diameter with orifices of 1 mm. or more, but as frequently they are scarcely noticeable and may have orifices visible only with a lens. There is no mention of the nature of the leaf apex in Miers' description, but I presume from the lanceolate shape that it is identical with var. *typica*.

Fawcett and Rendle describe and figure this plant as having a glabrous ovary and disk, as did Jacquin. After closely examining duplicates of the collections cited by Fawcett and Rendle, I have found that not all specimens have the glabrous condition. Actually a sparsely pubescent ovary and disk is by far the more common condition. The most reliable characters for distinguishing between the typical form and var. *brachycarpa* are in the fruits. The resemblance of the fruit of the Jamaican plants to that of *Leretia* is striking. They are remarkably similar in shape and structure; however, the fruits of *Leretia* are several times larger. In var. *typica* the drupe is flattened, rounded to an umbonate acute apex and narrowed to a cuneate base. The exocarp and mesocarp are thin and not fleshy. In dried condition these fruits never have the mesocarp distorted or squashed by pressing.

In var. *brachycarpa* the pistil and disk are usually densely strigose or hirsute with the hairs on the margin of the disk or, if extremely abundant, on the inside as well. The pubescence of the pistil is uniform and usually quite dense. This may approach the style or the style may be glabrous. The fruit is rounded at the base and subglobose in form, seldom tapering to the degree where it could be confused with var. *typica*. The mesocarp is fleshy so that, in practically all of the specimens I have seen, it has been squashed in pressing and the fruit is in an imperfect condition. The putamen is essentially smooth outside and is thicker than the more tenuous endocarp found in var. *typica*.

The occurrence of var. *typica* in Jamaica and the Oriente province of Cuba is supplemented by a recent collection from Panama. Except in the size of the leaves, which may be to 30 cm. long, these flowering specimens cannot be satisfactorily distinguished from var. *typica*. Therefore, until the fruit is known, it is advisable to place this collection here, even though the pistil and disk are more pubescent than the average. A collection from Porto Rico is also to be placed here. The leaves of this flowering specimen

are 14–19 cm. long and 6–8 cm. broad with both ends tapering and the apex sharp pointed. The pistil is sparsely pubescent with the disk glabrous.

Ekman's specimens from Haiti, cited in his flora, are both sterile but appear to be close to var. *brachycarpa*. So few collections are available from the Antilles outside of Cuba that an attempt must be made not to over-emphasize the differences in appearance of these collections until enough material is available to evaluate them correctly. Jack collected a large series of plants from one locality in Santa Clara province of Cuba and these numbers show the remarkable differences which might be expected in the species.

Both varieties appear to be plants of higher altitudes between 1500 and 3600 feet.

Species Excluded

Mappia origanoides (L.) House, Amer. Midl. Nat. **8**: 62. 1922 = *Satureja origanoides* L.

Mappia philippinensis Merr. Phil. Journ. Sci. **26**: 467. 1925 = *Apodytes cambodiana* Pierre.

Mappia senegalensis (Juss.) Baill. Hist. Pl. **5**: 277. 1874 = *Icacina senegalensis* Juss.

Nothapodytes Blume

Nothapodytes Blume, Mus. Bot. Lugd.-Bat. **1**: 248. 1850; Baillon, Adansonia **3**: 90. 1862–3.

Neoleretia Baehni, Compt. Rend. Soc. Phys. Hist. Nat. Genève **53**(1): 88. 1936; Candollea **7**: 177. 1936.

Mappia Jacq. Sect. *Trichocrater* Miers, Ann. Mag. Nat. Hist. II. **9**: 395. 1852; Engl. Nat. Pflanzenfam. III. **5**: 249. 1893.

Trees and shrubs, branches usually angular; leaves alternate or sub-opposite, the margins entire, subrevolute; petioles broadly and shallowly canaliculate; inflorescence terminal, rarely axillary, cymose or corymbose, flowers articulated to short ebracteate pedicels; calyx cupular, slightly five-toothed or lobed; petals 5, valvate, strigose or rarely short papillate-pubescent without, villose within, inflexed apex usually glabrous; stamens 5, free or rarely cohering by pressure to the base of the petals, the anther sacs ovate, longitudinally dehiscent, introrse, diverging at base, separate throughout their length, with a basal abaxial reflexed pulviniform appendage more or less cohering to the filament, connective about one-half the length of the anther, the filament fleshy, filiform, commonly flattened and slightly dilated at base, incurved at apex and attached dorsally to the anthers at the base of the connective; pistil symmetrical, the ovary hirsute, the style filiform to stout, the stigma capitate, truncate or oblique, the disk fleshy foliaceous, hirsute or glabrous within and on the edge, glabrous without, ovary one-celled, ovules two, anatropous, pendant from near the apex; drupe with a thin, rugose or smooth putamen, seed one, albuminous.

TYPE SPECIES: *Nothapodytes montana* Blume.

DISTRIBUTION: India, Malaysia, and the Philippine Islands.

Key to the species

Disk glabrous.

Leaves glabrous, obovate to lanceolate, base cuneate, costa horizontal; inflorescence commonly axillary, stigma oblique. Java *N. montana*

Leaves sparsely hirsute, elliptic to oblong-elliptic, base acute, veins gracefully arcuate; inflorescence terminal, usually two to the shoot apex, stigma truncate, concave. China (Yunnan), Siam *N. dimorpha*

Disk pubescent.

Lamina unequal at base, leaf scars lunar or triangular, conspicuous, petiole to 5 cm. long; young branches strigose; calyx not ciliate, petals short strigose outside, disk hirsute on the margin and inside; drupe with rounded apex, putamen rugose, endosperm with a foetid odor, embryo about one-half the length of the seed. India and Malaysia *N. foetida*

Lamina equal at base, leaf scars circular, inconspicuous, petioles short, 1–2.5 cm. long.

Leaves attenuate at apex, petiole 1–2 cm. long; branches strigose; calyx ciliate-margined, petals commonly short-papillate without at apex and on margins, disk glabrous on margin; drupe umbonate at apex, slightly flattened, putamen rugose, endosperm with foetid odor, embryo about one-half the length of the seed. Southwestern China *N. pittosporoides*

Leaves rounded at apex, petiole 1–2.5 cm. long; branches glabrous; calyx not conspicuously ciliate-margined, petals densely short-strigose without, disk conspicuously ciliate on margin; drupe rounded at apex, rarely slightly flattened, putamen smooth, endosperm not foetid, embryo nearly as long as the seed. Hainan *N. obtusifolia*

Nothapodytes montana Blume, Mus. Bot. Lugd.-Bat. **1**: 248. 1850.

Mappia montana Miers, Ann. Mag. Nat. Hist. II. **9**: 398. 1852; Contrib. **1**: 67. 1851–61; Miq. Fl. Ind. Bat. **1**: 790. 1856; Valeton, Crit. Overz. Olac. 183. 1886; Koorders and Valeton, Bijdr. Booms. Jav. **5**: 143. 1900; Koorders, Excurs. Jav. **2**: 532. 1912.

Small tree; leaf blade obovate to lanceolate, 10–14 cm. long, 3.5 cm. broad, thinly coriaceous, dark and shining above, paler beneath, glabrous, apex obtusely acuminate, blade attenuate to a cuneate base, veins prominent, reticulate, costa horizontal; inflorescence corymbose, axillary or terminal, pedicels short, ebracteate; buds sericeous; calyx cupular, obscurely five-toothed, persistent; petals linear; stamens with filiform filaments, the anthers oblong, dorsally affixed; pistil hirsute, the ovary ovoid, the style filiform, the stigma capitate, oblique, emarginate, the disk fleshy, lobed, glabrous on both sides; drupe fleshy, ellipsoid, one-seeded. (Description compiled from Blume and Valeton.)

TYPE LOCALITY: Western Java.

ILLUSTRATION: Valeton, Crit. Overz. Olac. *pl.* 5, *fig.* 28. 1886.

DISTRIBUTION: Valeton (l.c. 183) reports this species from Sumatra in addition to the type locality in Java.

I have seen no material of this species. The type was in the herbarium at Leiden, and Koorders and Valeton apparently saw a second collection.

Blume described this as the type species of a new genus. Miers reduced the genus and placed *Nothapodytes* in *Mappia* as a subgenus. Bentham and Hooker referred it to *Apodytes*; however, Beccari disagreed and considered the species under *Mappia*. Engler has followed Miers. Baehni concluded the species could not belong either in *Apodytes* or *Mappia* but he failed to recognize its similarity to his new genus *Neoleretia*. Sleumer has shown these two genera to be the same and referred the species of *Neoleretia* to the genus *Nothapodytes*.

There is an important difference between the descriptions of Miers and Valeton. Miers reports the disk around the pistil to be long-pubescent on

the inside. Valeton reports and figures the disk as glabrous. Obviously another report is needed from someone who has access to this material. If it is glabrous, as Valeton reports, the species is similar to *N. dimorpha*, yet the other characters maintain the identity of each species. If, however, the disk is hirsute, the plant would closely approach the condition found in *N. obtusifolia* and perhaps *N. pittosporoides* and may replace one or the other.

Nothapodytes dimorpha (Craib) Sleumer, Notizbl. **15**: 247. 1940.

Mappia dimorpha Craib, Kew Bull. **1926**: 347. 1926.

Neoleretia dimorpha Baehni, Candollea **7**: 178. 1936.

Tree to 10 m., stems terete but longitudinally striate and ridged, young branches hirsute, becoming glabrate; leaves alternate, or opposite at the terminal dichotomies of the shoots; petioles 3–5 cm. in length, wiry, deeply canaliculate above, sparsely hirsute; lamina elliptic to oblong-elliptic, 18 cm. long to 8.7 cm. broad, membranaceous, paler in color below, apex acuminate, base acute, midrib and veins densely short-pilose or crispate above, slightly prominent, sparsely to densely hirsute below, the veins 8–10 pairs, prominent, gracefully arcuate, anastomosing near margin, the margin ciliate; inflorescence terminal, frequently two from the shoot apex, the axis appressed-crispate or strigose; calyx campanulate, 3 mm. in diameter, 2 mm. high, moderately lobed, the lobes to 0.8 mm. high, sparsely strigose; petals oblong, 4.5–6 mm. long, 1.2–1.5 mm. broad, densely strigose without, pilose within except at apex and base, inflexed tip 0.3 mm. long, frequently papillate; stamens 4.2–4.4 mm. long, the filaments slender, fleshy, 3–4 mm. long, the anther sacs 1–1.2 mm. long; pistil 4–4.5 mm. high at anthesis, the ovary 1–1.4 mm. in diameter, sparsely to densely hirsute, the style 2–2.8 mm. long, glabrous, the stigma capitate, truncate or concave at apex, the disk fleshy, crenulate-margined, frequently deeply lobed, glabrous, to 1 mm. in height; fruit not known.

TYPE LOCALITY: Sukotai, Siam.

ILLUSTRATION: Plate III.

DISTRIBUTION: Siam, China (Yunnan).

CHINA: Y u n n a n : Hills of Tso-si, *Maire* 239 (A).

The cited specimen consists of several flowering branch tips with a single mature leaf. The leaf is only 9 cm. long and 4.5 cm. broad with a petiole of 1.9 cm., much smaller than that cited for the type. However, all other characters are in agreement. This plant is also unusual in possessing two inflorescences at the apex of the shoot with the subtending leaves opposite. These inflorescences, with pedicels of 2 cm. and a diameter of 2 cm., are much smaller than those Craib described. Maire reports that the flowers are yellow and that the plant was collected at an altitude of 2450 m.

My material is inadequate and I have been forced to adopt my description from that given by Craib.

Nothapodytes pittosporoides (Oliv.) Sleumer, Notizbl. **15**: 247. 1940.

Mappia pittosporoides Oliv. in Hook. Ic. **18**: pl. 1762. 1888.

Neoleretia pittosporioides Baehni, Candollea **7**: 178. 1936.

Woody bush or rarely a tree, 1.5–5 m. tall, branches mostly green, terete, rarely angular, the leaf scars not conspicuous, circular, the youngest

branches strigose, becoming glabrate; petioles 1–2.2 cm. long, broadly sulcate above, commonly strigose at least in the sulca; lamina oblong or commonly oblanceolate, 10–15 cm. long, 2–4.5 cm. broad, thinly coriaceous, dark green and frequently shining above, lighter below, commonly turning black on drying, when young densely golden-strigose especially beneath, the midribs and veins commonly light yellow in color, commonly hirsute, glabrate at maturity, the veins 6–8 pairs, weakly developed and anastomosing; inflorescence axis frequently flattened, hirsute; calyx campanulate, 3 mm. in diameter, membranaceous, ciliate on margins and sparsely strigose without, five-toothed, teeth deltoid, to 1.2 mm. long, increasing slightly in fruit; petals oblong, 6.3–7.4 mm. long, 1–2.1 mm. broad, inflexed apex fleshy, 1 mm. long, strigose without, commonly papillate on apex and margins, long-villose within; stamens 5–6 mm. long, the filaments 4–5 mm. long, slightly thickened at base, the anthers ovate, 1–1.3 mm. long; pistil 3.5–4 mm. high, disk fleshy, irregularly lobed or deeply crenulate, glabrous without and on margin, sparsely hirsute within, persistent in the fruit, the ovary evenly hirsute, 1.1–1.4 mm. diameter at anthesis, indistinctly truncated; drupe ellipsoid to oblong-ovoid, slightly flattened, 1–1.8 cm. long, 0.6–0.8 cm. in diameter, distinctly umbonate at apex, commonly minutely pubescent at maturity, the putamen thin, rugose, the endosperm with noticeable foetid odor, the embryo about one-half the length of the seed, the cotyledons ovate, 4.5 mm. long, 3.5–4 mm. broad, the radicle cylindrical, 2 mm. long.

TYPE LOCALITY: Ichang, Hupeh, China.

ILLUSTRATIONS: Hook. Ic. 18: pl. 1762. 1888; Baehni, Candollea 7: pl. 4, fig. 2, A–B. 1936.

DISTRIBUTION: Western China (Hunan, Hupeh, Kwangtung, Kweichow, Szechuan).

CHINA: H u n a n : Hsikwangschan, Hsinhwa, *Handel-Mazzetti* 778 (A); Yang-Shan Changning Hsien, *Fan and Li* 179 (A). H u p e h : Ichang, *Henry* 3990 (type coll. NY), 3536 (A, G, US), 3537a (G), 4118 (A, G, US); Hsing-shan, Chang lo Hinen, *Wilson* 3296 (A, G, US). K w a n g t u n g : Yu-yuen, *Ko* 52863 (A). K w e i - c h o w : Liang Feng Yah, *Steward, Chiao and Cheo* 241 (A, NY, US). S z e c h u a n : Mt. Omei, *Wilson* 4945 (A), *Wang* 23215 (A); Mt. Weol, *Wilson* 4440 (A); Mt. Wal, *Wilson* 3295 (A, G, US); Kientschang, *Handel-Mazzetti* 1047 (US); Yu-chi k'on, *Smith* 2360 (A); no locality given, *Wilson* 3234 (A).

This species is limited to western China. Handel-Mazzetti reports its habit to be rocky slopes or cliffs, Wilson reports thickets, and Steward mentions wooded slopes. The substratum, according to Handel-Mazzetti, is usually calcareous or schistose. The species grows at an altitude of from 650–1750 m. and is a bush (60 cm. ex Handel-Mazzetti) or a small tree (5–10, rarely to 20, feet, ex Wilson). The oblanceolate leaves are usually clustered at the apex of the shoots. The inflorescence has fewer flowers than most species of the genus, and these flowers are yellow and have a foetid odor resembling that of *N. foetida*. This odor is also present in the endosperm of the seed. The fruit is red when mature and usually turns black on drying. The calyx enlarges slightly with the fruit and remnants of the disk are also present. The endosperm is divided into two concentric zones with the outer usually of a harder consistency.

Nothapodytes obtusifolia (Merrill) comb. nov.*Mappia obtusifolia* Merr. Lingnan Sci. Jour. **14**: 28. 1935.

Woody bush or tree, 3–24 m. in height, diameter of trunk to 35 cm., the bark gray, the branches terete, glabrous; leaves alternate, the upper ones frequently aggregated near the tip of the shoot, almost opposite; the petioles 1.2–2.5 cm. long, terete or obscurely flattened, glabrous, olive-brown in color, the lamina oblanceolate-oblong or rarely oblong, 9–18 cm. long, 3–6.5 cm. broad, chartaceous to thin-coriaceous, olive green on both sides, not darkening on drying, glabrous, apex obtuse or rounded, base cuneate to acute, the veins 7–8 pairs, only slightly and equally developed on both sides of the midrib, forking abruptly midway to the margins, laxly reticulate; cymes 3–5 cm. broad on peduncles 3–4 cm. long, the axes slightly flattened, moderately strigose; calyx campanulate or spreading, 2–2.3 mm. in diameter, 1.5 mm. high, strigose on surface and slightly so on margins, weakly 5-toothed; petals oblong to lanceolate, 6.9–7.2 mm. long, 2.1–2.5 mm. broad, densely short-strigose without, weakly hirsute within, the inflexed tip 0.5 mm. long; stamens 5.5–6.4 mm. long, the anther sacs ovate-oblong, 2–2.7 mm. long and 1.5 mm. wide, the filament 4–5 mm. long; pistil 3–3.7 mm. high, the ovary 1 mm. in diameter, hirsute, the style stout, 2 mm. long, more or less hirsute but commonly glabrous below the stigma, the stigma oblique, bilobed, the disk thin, fleshy, 0.3 mm. high, glabrous without but densely ciliate on margin, hirsute within, margin crenulate, never lobed; drupe oblong-ovoid, 9–13 mm. long, 6–9 mm. in diameter, circular in cross-section, rarely flattened, moderately hirsute when young, becoming glabrate, the putamen thin, almost smooth; seed 7.8–9 mm. long, the ovate cotyledons 5.2–6 mm. wide, cordate at base, strongly three-nerved, the radicle cylindrical, 2.3 mm. long.

TYPE LOCALITY: Ngai district, Hainan.

ILLUSTRATIONS: Merrill, Lingnan Sci. Jour. **14**: 29. 1935.

DISTRIBUTION: China (Hainan).

CHINA: H a i n a n : Yaichow, alt. 1700 feet, *How* 70623 (A, NY, US); alt. 1100 feet, *Chun and Tso* 44674 (A, NY, US); Yai hsien, *Lau* 5794 (A); Naam Shan Leng, Ngai district, *Lau* 233 (type NY, US).

This plant is reported to have fragrant flowers and so is quite in contrast with *N. foetida* and *N. pittosporoides*. The fruit is red and the endosperm lacks the foetid odor found in the other species. This species was overlooked by both Baehni and Sleumer.

Nothapodytes foetida (Wight) Sleumer, Notizbl. **15**: 247. 1940.*Stemonurus foetidus* Wight, Ic. **3**: 955. 1843–5.*Mappia foetida* Miers, Ann. Mag. Nat. Hist. II. **9**: 395. 1852.*Mappia oblonga* Miers, l.c. 396.*Mappia ovata* Miers, l.c. 396.*Mappia Gardneriana* Miers, l.c. 396.*Mappia Championiana* Miers, l.c. 397.*Mappia Wightiana* Miers, l.c. 397.*Mappia tomentosa* Miers, l.c. 397.*Mappia tomentella* Miers ex Valetton, Crit. Overz. Olac. 183. 1886.*Mappia cambodiana* Pierre, Fl. For. Cochinch. **17**: 267. 1892.*Neoleretia foetida* Baehni, Candollea **7**: 177. 1936.

Trees to 15 m. in height; branches conspicuously angular with large triangular leaf scars; petioles 1.4–5.3 cm. long, averaging 3 cm., strigose espe-

cially in the sulca; lamina variably elliptic-ovate or lance-oblong, 10–20 cm. long, 5–12 cm. broad, membranaceous or moderately coriaceous, at least the young leaves turning black on drying, sparsely pubescent above, glabrate below or sparsely pilose with the veins hirsute or tomentose, attenuate at apex, the base attenuate or rounded, unequal, the nerves 7–8 pairs, prominent below, scarcely evident above, the peduncles and rachises of inflorescences flattened or angled, crispose- or strigose-pubescent; calyx campanulate, 2.4–3 mm. in diameter, the five teeth rarely exceeding 0.2 mm. in height, strigose or glabrate; the petals lance-oblong, 4.2–5 mm. long, 1.5–1.8 mm. broad, appressed-strigose without, villose within, the inflexed apex with short-villose pubescence; the filaments 3.1–4 mm. long, the ovate anther sacs 1–1.2 mm. long, the disk slightly lobed, glabrous without, hirsute on the margin and inner surface, 0.2–0.3 mm. high, the ovary 1–1.5 mm. in diameter at anthesis, densely hirsute or pubescent in definite lines, the style stout, 1.1–1.4 mm. long, densely hirsute to glabrate, the stigma capitate, truncate or bilobed and oblique; drupe oblong-ovoid, 1–2 cm. long, 0.8–1 cm. in diameter, black, commonly minutely pubescent, the putamen thin and woody, the endosperm with a foetid odor, the embryo usually one-half the length of the seed, the cotyledons ovate, usually displaced laterally, their margins not superimposed.

TYPE LOCALITY: Nilgiri Hills, India.

ILLUSTRATIONS: Pierre, Fl. For. Cochinch. **17**: 267, as *Mappia cambodiana*. 1892; Beddome, Fl. Sylv. *t.* 141. 1871; Brandis, Indian Trees, *fig.* 70. 1915; Fyson, Fl. South India Hill Stations **2**: *t.* 81. 1932; Fyson, Fl. Nilgiri and Pulney Hill-tops **2**: 58. 1912; Baehni, Candollea **7**: *pl.* 4, *fig.* 2, *D F*, as *Mappia foetida*. 1936; Wight, Ic. Pl. Ind. Or. **3**: 955. 1843–5; Spicil. Neilgher. **1**: 23, as *Stemonurus foetidus*. 1851; Valetton, Crit. Overz. Olac. *pl.* 5, *fig.* 26. 1886; Talbot, For. Fl. Bombay **1**: 266, as *Mappia oblonga*. 1909; Miers, Contrib. Bot. **1**: *pl.* 8. 1851–61; Valetton, Crit. Overz. Olac. *pl.* 5, *fig.* 27, as *Mappia ovata*. 1886; Schnizl. Icon. **4**: 233a, *figs.* 9–11, as *Mappia tomentosa*. 1886.

DISTRIBUTION: Southern India (Western Ghats, Mysore), Ceylon, Cambodia, Botel Tobago.

SOUTHERN INDIA: Penn. Orient., *Wight* 431 (G, NY); Nilgiri hills, *King* (US 263706); *Gardner* (NY); *Hooker and Thomson* (G); Ootacamund, Oct. 17, 1921, *Wilson* (A), Oct. 16, 1921, *Wilson* (A); Pulney hills, Kodaikanal region, *Anglade collection s.n.* (A); Malabar, Concan, etc., *Stocks, Law*, etc., *Hooker and Thomson* Herb. (G). CEYLON: *Gardner* 98 (G, type coll. of *Mappia Gardneri*); *Gardner* 99 (G, NY, type coll. of *Mappia ovata*); *Thwaites* 492 (G, NY); near Badulla, *Silva* 24 (NY). BOTEL TOBAGO: Feb. 7, 1920, *S. Sasaki* (A).

This range is extremely wide. I have not seen the Cambodian material of Pierre. The plant from Botel Tobago was misidentified in the herbarium, this fruiting specimen is very similar to specimens of *N. foetida* from Ceylon and India, particularly those of *Gardner* 99, *Silva* 24, *Wight* 492, and *Wilson s.n.* cited above. More collections from the middle of this range with more detailed habitat and altitude notes are quite desirable.

NATIVE NAMES: Stinking may tree, gur, halgur, ganera (Nairne); stinking lamp, Ganda pang (Miers); gandapana (Trimen); gandaoaanapas (Thwaites); Kodsas, hedare (Talbot); ghánera (Cooke); Kala gaura, Arali (Brandis).

The majority of writers since Miers have tended to lump *M. Gardneriana*, *ovata*, *tomentosa*, and *cambodiana* under *foetida* as the specific differences

are poor. Thwaites and Trimen considered them, in part, as varieties.

In the course of the present study differences were observed, in the material at my disposal, which have not been mentioned in the literature. The significance of these differences cannot be determined from limited material but it is deemed advisable to indicate them.

The species here included were established on the basis of leaf size, shape and pubescence. These are acknowledged to be variable by Trimen, Thwaites, Baehni, Fyson, Wight and others. For example, the glabrate petiole may vary in length, in one specimen (*Gardner 99*, isotype of *M. ovata*) from 1.5 cm. to 5 cm., but the average length for petioles of this complex is 3 cm. In my material the base of the leaf is always unequal and the pubescence is deciduous upon maturity of the leaf. Most of the juvenile leaves are pubescent on both surfaces. The midribs and veins alone possess hairs on the upper surface of the older leaves and on the lower surfaces bear more hairs than the lamina. In the specimens I have seen which had been identified as *M. tomentosa* the pubescence is dense and crispose with the hairs limited to the veins and veinlets. In *Gardner 98* tufts of hairs are present in the axils of the veins and the midrib in mature leaves. The pubescence on the inflorescence is more striking, as it is variable in length and color as well as density of the hairs. The calyx teeth show extremes of development and of indument. The pubescence on the inside of the petals is late in developing. If the buds are small the hairs may be entirely suppressed and an uneven development may occur if the stamens are tightly appressed to the petals. Thus it is possible, at different stages of petal- and bud-development, to have long and apparently fully developed hairs in some portions and glabrous areas in other regions of the petals. When mature the petals are reflexed and, usually, the indument is uniformly developed. The stamens are commonly as long as the petals. In *Gardner 98*, however, the filaments fail to elongate and the pollen content of the thecae is much reduced.

Pierre makes no mention of a disk in his description, nor does he figure it in the plate of *M. cambodiana*. Baehni, however, examined authentic material, and so I assume that the synonymy is correct.

All fruits of this group are pubescent when young. This may persist to maturity or the fruit may be strictly glabrate when mature. A thin, commonly rugose, putamen exists in this group which has two ridges developed lateral to the funicle. The single seed usually fills the locule but the remnants of the other ovule may frequently be found. There is a differentiation of the foetid endosperm into a hard and usually darker outer layer and a lighter colored but frequently even harder inner layer. The lateral displacement of the cotyledons is of particular interest. In *Thwaites 492* the cotyledons are regularly orbicular in shape and only slightly displaced laterally. In the *Stocks, Law* specimen the cotyledons have a very irregular or lobed shape and are greatly displaced with the median line of the cotyledon being as much as 30° to 45° from the center. In the *Anglade* specimen labelled *M. tomentosa*, the cotyledons are likewise strongly displaced,

but here the shape is regular, ovate or oblong. These variations in displacement and form appear in a regularly increasing series relative to the length of the seed; that is, the seeds of *Thwaites* 492 are ovoid and about as wide as long while those of the *Anglade* specimen are oblong and twice as long as wide. The *Stocks, Law* specimen is intermediate. I cannot determine the significance of this variation from the few fruiting specimens I have. Pierre says that Miers' species can be separated on leaf size and fruit characters, but does not elaborate on this statement. Neither Baehni nor Sleumer, who both lump Miers' species, comment on this. While the size of the fruit will vary on the same sheet (possibly stages of development), the embryo form, in those I have examined, is constant. The embryo, which is commonly as large as the seed, is usually oriented at right angles to the raphe. The funicle is flattened and is relatively thin. It is located in the mesocarp between projecting ridges of the putamen. It runs the length of the fruit in this manner and enters the locule very near the apex. The raphe descends the broad face of the seed, which is frequently slightly flattened, and terminates in a circular chalaza at the end opposite the micropyle.

The flowers are reported by Fyson to be "extraordinarily evil smelling." Miers says that the native name means "stinking lamp on account of the extremely foetid odor of the flowers." Gamble (Fl. Pres. Madras **I**: 196. 1915) has a key to the several species he recognizes, and distinguishes between these by the absence of a foetid odor in some. He also considers the texture of the leaves, i.e. membranaceous or coriaceous, as a significant difference and incorporates this in his key. Thwaites and Trimen have pointed out that this is a character varying with the altitude. Beddome also recognizes this and notes that the plants range in altitude from sea level to 7-8000 feet.

Species Excluded

Nothapodytes philippinensis (Merr.) Sleumer, Notizbl. **15**: 247. 1940.

Mappia philippinensis Merr. Phil. Journ. Sci. **26**: 467. 1925.

Ncoletetia philippinensis Baehni, Candollea **7**: 80. 1936.

Both Baehni and Sleumer ignored the glabrous condition of the inner surface of the petals in this species and allowed it to remain in the *Mappia* complex. Through the kindness of the curator of the herbarium of the Philippine Bureau of Science I was able to borrow and examine the type specimen of this plant. It must now be referred to the synonymy of *Apodytes cambodiana* Pierre, Fl. For. Cochinch. t. 267. 1892.

Humirianthera Huber

Humirianthera Huber, Bul. Soc. Bot. Genève II. **6**: 184. 1914; Baehni, Candollea **7**: 181. 1936.

Vines or shrubs with scandent branches, rhizomatous, the rhizomes or tubers large; leaves alternate, usually membranaceous, entire; flowers perfect, 5-parted, articulated at the base of the calyx to bracteate pedicels; calyx deeply lobed, the lobes frequently unequal in length; petals equal, ovate to lanceolate, valvate, appressed-pubescent without, villose or crispose-pubescent within, apex inflexed; stamens free, the filaments thickened at

base, attenuate towards apex and inflexed, the anther sacs subglobose to oblong, introrse, longitudinally dehiscent, the connective triangular, broadest at base and projecting beyond anther sacs; ovary hirsute, unilocular, the ovules two, anatropous, collaterally pendulous; style incurved, glabrous, the stigma small, capitate; fruit drupaceous, oval to globose, exocarp tenuous, mesocarp thick and fleshy becoming woody, the putamen housing a tubular funicular canal, the seed one, albuminous.

TYPE SPECIES: *Humirianthera ampla* (Miers) Baehni.

DISTRIBUTION: Brazil, Colombia, Venezuela.

Huber established this genus on material collected by Ducke in Brazil and gave the genus an appropriate name by indicating the superficial similarities of the stamens with those found in the Humiriaceae. The anther sacs of both the Humiriaceae and *Humirianthera* are small and diverge at the base. The connective is large and fleshy and characteristically continues past the anther sacs in a triangular extension. The filament is attenuate at the apex and inflexed before its attachment to the base of the connective. Neither Miers nor Engler mention these features in their description of *H. ampla*, although Baillón does. Apparently Valetón's work was overlooked by both Huber and Baehni, since he gives a good description of this connective and indicates the similarity to the Humiriaceae. Valetón maintained *H. ampla* as a species of *Leretia* as he was able to find in *L. cordata* a projection of the filiform connective as a slight tip beyond the oblong anther sacs. The width of this connective varies, and Valetón interpreted the condition found in *H. ampla* as an extreme development, i.e., widening and extension, of the sterile connective tissue. Baehni examined isotype material of *L. ampla* and *H. Duckei*, Huber's type species, and concluded that they were identical. I have only cited specimens of *H. Duckei* to compare with isotypes of *L. ampla* but I believe that Baehni is correct. The type species of the genus therefore, should be called *H. ampla* (Miers) Baehni.

The shape of the anthers is the single character upon which Huber and Baehni maintain this genus. While this character is most readily recognized, there are others which support the genus. The occurrence of stellate hairs is infrequent in the Icacinaceae and appears to be quite typical of the few genera which do have them. The presence of these clusters in *H. rupestris* and *H. crispula* and the tendency in *H. ampla* to have the hairs clustered is significant in characterizing the genus. The stellate cluster in *Humirianthera* consists of a single erect, thick, rugose-walled hair surrounded by a basal rosette of arching, smooth-walled hairs. The deeply lobed calyx, which is densely covered without with strigose or curved hairs, is easily recognized. The petals are strigose without and usually covered within with a dense tangled mat of crispose hairs or simply a dense pubescence of villose hairs.

Fruits are known only for *H. rupestris*. Since there is so little variation in the fruits within the genera of the Icacinaceae, it is safe to assume that those of the other two species will be similar when found. Ducke reports that the mesocarp is fleshy, but in a dried condition its texture is fibrous or

even woody. The putamen is smooth both inside and outside. The entire fruit is quite a bit larger than that found in any of the related genera, and the presence of single strigose hairs and stellate hair clusters on the mature fruit is characteristic.

The underground structures of the New World genera of the Icacinaceae are unknown. Such structures, especially of woody plants, are not readily obtained by collectors. There are, however, several reports of the root system of *Humirianthera* in the literature. Le Cointe, Ducke and others describe the plants as woody shrubs, or bushes, with rhizomes or tubers. The tuber may be up to 40 cm. in diameter and weigh nearly 100 kilos and, when powdered, may yield as much as 16 kilos of starch. These tubers contain a poisonous principle which is readily removed by repeated washings, after which the starchy material may be used for food. The fruits are reported to be the size of a hen's egg and these also contain starch. This type of underground system is unusual since most of the genera in this family are trees and shrubs. It is interesting to note that Hutchinson and Dalziel have reported similar tubers for *Icacina* in tropical West Africa and Engler found a similar underground system in *Trematosperma*. Hutchinson and Dalziel also describe a washing process for the *Icacina* tubers to remove the poison principle before they can be used. *Icacina* is reported to have a habit similar to that found in *Humirianthera* while *Trematosperma* is a true liana. This same type of underground system might be expected in several other genera of the Icacinaceae with a similar bushy scrambling habit.

The genus now contains three species. These are limited to South America and are found mainly in the Amazon basin. The plants are reported growing in open locations on the edges of both primary and secondary forests which are not inundated. The closest relationship of this genus is with *Leretia*.

Key to the species

Petals glabrous in the lower third of the inner surface, this region usually fleshy and swollen into a ridge or flap, the entire plant bearing a characteristic red-brown stellate pubescence; leaves rhomboid, widest at the middle, veins arcuate but weakly if at all anastomosing at the margins; inflorescence terminal. .*H. rupestris*

Petals pubescent almost to the base within, lacking the fleshy ridge or flap; veins of the leaves arcuate and strongly anastomosing at margin.

Inflorescence and leaves commonly simple-pubescent, becoming glabrate, hairs rarely gathered into small numbered clusters; pubescence on the inside of the petals straight or only slightly curly; leaves broadly lanceolate to elliptical, flat, base rounded; anther sacs when mature one-fourth to one-third the length of the anther*H. ampla*

Inflorescence and leaves stellate-pubescent, hairs yellow-brown; inside of the petals densely curly-crispose to base; leaves elliptic to orbicular, midrib commonly arching so that the pressed leaves are frequently plicate, base slightly cordate; anther sacs when mature one-half to two-thirds the length of the anthers
.....*H. crispula*

Humirianthera rupestris Ducke, Arch. Jard. Bot. Rio 4: 118. 1925; Baehni, Candollea 7: 189. 1936; Le Cointe, Arvores e Plantas Uteis 457. 1934.

Scandent shrub, the rhizome an enormous starchy tuber; stems angular,

densely red-brown stellate-pubescent, lenticels minute and inconspicuous, the petioles 6–9 mm. long, stellate-pubescent; lamina rhomboid to ovate, 10–15 cm. long, 6–8 cm. broad, acuminate at apex, rounded at base, stellate-pubescent above and below especially on the veins and midrib; inflorescence axis sparingly stellate-pubescent or tomentose, bracts of the pedicels small, ovate, acute; calyx 4 mm. in diameter, the lobes triangular, acute, 1.3 mm. long, strigose-pubescent; petals ovate to oblong, 4.1–4.3 mm. long, 1.6–1.9 mm. broad, strigose without, villose within with a glabrous base, the center area protruding in a prominent fleshy ridge or flap, the apex inflexed; stamens one-half to two-thirds the length of the petals, the anthers 0.6 mm. long and 0.4 mm. wide, the anther sacs 0.1–0.2 mm. in diameter, the filament glabrous, 2.5–2.6 mm. long; ovary globose, 1.2 mm. high and 0.8 mm. in diameter, hirsute, the style less than one-half the length of the ovary, recurved; fruit broadly ovoid to globose, 5 cm. long and 4 cm. wide, densely stellate-pubescent, the mesocarp to 3 mm. thick, woody when dry, the putamen woody, smooth, to 0.7 mm. thick, the seed albuminous, the cotyledons ovate, thin, frequently folded or contorted.

TYPE LOCALITY: Pará, Brazil.

DISTRIBUTION: Amazonian Brazil.

BRAZIL: Pará: Montealegre, Seru de Aroxy, on rocky ground, flowering in Dec. and fruiting in April, *Ducke* 9969 (US); Amazonas: Santa Izabel, Rio Negro, flowers yellow, *Ducke* 342 (A, NY, US); Manaus, above Cochoeirinha, *Ducke* 25288 (US).

NATIVE NAMES: Mandioca-assu (Le Cointe), Mandiocassu, maira (Ducke). The common name of false mandioc is probably derived from the starchy character of the rhizome.

Humirianthera ampla (Miers) Baehni, *Candollea* **7**: 182. 1936.

Leretia ampla Miers, *Ann. Mag. Nat. Hist.* III. **4**: 364. 1859; Valetton, *Crit. Overz. Olac.* 186. 1885.

Mappia ampla Engl. in *Mart. Fl. Bras.* **12**(2): 51. 1872.

Humirianthera Duckei Huber, *Bull. Soc. Bot. Genève* II. **6**: 184. 1914; Ducke, *Arch. Jard. Bot. Rio* **3**: 206. 1922; *op. cit.* **4**: 118. 1925; Le Cointe, *Arvores e Plantas Uteis* 457. 1934.

Rhizomatous shrub or bush, young branches somewhat angular, glabrous, lenticels oblong, conspicuous, much lighter in color than the stem; petioles 8–10 mm. long, glabrate; lamina broadly lanceolate to elliptical, 8–20 cm. by 3–10 cm., the apex obtuse to acuminate, the base nearly acute or rounded, the midrib and veins prominent below; inflorescence axillary or terminal, strigose; calyx patelliform, lobes 1.3–1.6 mm. long, lanceolate, densely hirsute without; petals ovate-lanceolate to ovate, 3.5–4.3 mm. long, 1.4–2 mm. broad, almost equal, strigose without, villose, tomentose or rarely crispose within, the inflexed apex glabrous; filaments 2–3 mm. long, the anther sacs globose, connective tapering to an extended apex 0.6–0.8 mm. long; ovary globose, 1 mm. in diameter at anthesis, hirsute; the style 0.7 mm. long, glabrous, slightly incurved; fruit unknown.

TYPE LOCALITY: Near San Carlos on the Rio Negro, Venezuela.

ILLUSTRATION: Valetton, *Crit. Overz. Olac. pl.* 5, *fig.* 31. 1886.

DISTRIBUTION: Amazonian Venezuela and Brazil.

VENEZUELA: Amazonas: San Carlos on the Rio Negro, *Spruce* 3776 (FM, G, NY). BRAZIL: Pará: Obidos, *Ducke* 20633 (US); Trombetas, Rio Cumina-

mirim, *Ducke 14843* (US); Faro, *Ducke 8638* (US); A m a z o n a s : Itacoatira, *Ducke 12479* (US).

NATIVE NAMES: Maria, Apolo (Ducke), Mandioca ossu (Le Cointe).

The numerous collections of *Spruce 3776* show a large range of leaf size for this species. The average size seems to be 5–10 cm. long and 7–13 cm. wide, although a photograph of the type sheet shows one leaf with dimensions of 20 cm. by 10 cm., which agrees with the figures published by Engler. This Spruce collection is commonly reported from Brazil; however, it was made in adjacent Venezuela, as verified in Spruce's account of his trip as reported by Wallace.

***Humirianthera crispula* sp. nov.**

Frutex usque ad 1–2 m. altus, ramis gracilibus, ramulis novellis teretibus sparse fulvo-stellato-pilosis; laminis foliorum ellipticis, orbicularibus vel ovatis, 9–13 cm. longis, 6–8 cm. latis, membranaceis, subtus dense pilosis (pilis non raro fasciculatis), apice obtusis vel raro acutis, basi rotundatis usque subcordatis; costa supra strigosa subtus prominenter strigosa pilis paucis stellatis ornata, venis primariis 4–5 arcuatis subtus prominulis supra sparse piliferis; cymis axillaribus aut terminalibus, laxis, ramulis hirsutis pilis stellatis ornatis; floribus usque ad 5 mm. latis; calyce late campanulato 4 mm. diametro, lobis oblongis abrupte acuminatis 1.4–1.8 mm. longis, 0.8–1 mm. latis, dense strigosis; petalis sub anthesi lanceolatis, maturitate ovatis, 4 mm. longis, 1.1–1.4 mm. latis, extus dense strigosis intus imo ad basim crispe pilosis; staminibus 2.5–3.2 mm. longis; antheris ovatis vel oblongis apice divergentibus 0.5 mm. longis, connectivo triangulari apicem antherarum 0.4 mm. superante, haud incrassato, filamentis maturis ca. 2–2.6 mm. longis filiformibus, apice attenuatis inflexis; ovario ovoideo dense strigoso, stylo brevi ovarium subaequante glabro recurvato; fructu ignoto.

COLOMBIA: B o y a c á : "Mercedes" on Cano Canacabure, about 10 km. above the mouth, alt. 180 m., flowers yellow, inodorous, abundant on savannah at edge of forest, Feb. 20, 1939, *Haught 2619* (TYPE US, isotype G).

The inflorescence in this species appears to be developed terminally, and by subsequent growth of a lateral shoot it assumes an axillary position. The cyme is up to 8 cm. high and 15 cm. wide. The petioles of the leaves are only slightly canaliculate above and become noticeably corky in age. They are sparsely stellate-pubescent and between 7 and 10 mm. in length. This collection from Colombia represents the first of the genus from that country. *Humirianthera crispula* is closest to *H. ampla*.

EXPLANATION OF PLATES

PLATE I

Mappia mexicana Robins. & Greenm. *Pringle 5094.*

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Longitudinal section of the pistil, $\times 14$; 3. Fruit, $\times \frac{1}{2}$; 4. Longitudinal section of the fruit, $\times \frac{1}{2}$; 5. Longitudinal section of the seed, $\times \frac{1}{2}$; 6. Pistil, showing the glabrous ovary and disk, $\times 14$; 7. Side view of a petal, $\times 11$; 8. Adaxial surface of a petal, showing the reduced amount of pubescence, $\times 11$; 9. Habit sketch of a partly opened bud, showing the glabrous outer surface of the petals, the slightly pubescent calyx teeth, the glabrous ebracteate pedicels, and the floral articulation, $\times 9$; 10. Portion of a mature stamen showing the filament and connective after the anther sacs have fallen, $\times 16$; 11-13. Lateral, abaxial, adaxial views of the stamens showing the basal attachment of the filament and the connective, $\times 16$.

PLATE II

Figs. 1-3. *Mappia angustifolia* Griseb. *Wright 2638.*

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Adaxial surface of the petal, showing aggregation of pubescence in the lower portion, $\times 10$; 3. Pistil, showing the hirsute ovary but glabrous disk, $\times 17$.

Figs. 4-13. *Mappia racemosa* Jacq. var. *brachycarpa* Griseb. *Jack 6979.*

Fig. 4. Habit, $\times \frac{1}{2}$; 5. Pistil, showing the hirsute ovary with a disk ciliate on the margin, $\times 11$; 6. Side view of fruit showing the rounded base, $\times \frac{1}{2}$; 7. End view of fruit, $\times \frac{1}{2}$; 8. Longitudinal section of the seed, $\times \frac{1}{2}$; 9. Ovarian disk with the pistil removed, showing the pubescence on the margin and the inside, $\times 20$; 10. Pistil with ovarian disk removed, showing the glabrous base, $\times 11$; 11-13. Lateral, abaxial, and adaxial views of the stamens, $\times 9$.

PLATE III

Nothapodytes dimorpha Craib. *Maire 237.*

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Pistil, showing the hirsute ovary and glabrous disk, $\times 10$; 3. Adaxial surface of a petal showing the inflexed apex, papillate hairs on the outer surface and the short clavate hairs inside, $\times 9$; 4. Bud, showing the lobed calyx, $\times 6$; 5-7. Adaxial, lateral, and abaxial views of the stamens, showing the dorsal attachment of the filaments to the connective, the arching of the filament behind the anther, and the reflexed basal lobes of the anther tissue connected to the filament, $\times 11$.

PLATE IV

Humirianthera crispula Howard. *Haught 2619.*

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Open flower, showing the bracteate hirsute pedicel and the floral articulation below the calyx, $\times 8$; 3. Mature recurved petal with extended tip showing the even crispose pubescence on the inside; note the change of shape from Fig. 4, $\times 7$; 4. Petal taken from bud, $\times 7$; 5. Side view of a petal, $\times 7$; 6. Basal view of the expanded calyx, $\times 7.5$; 7. Stellate cluster of hairs showing the rugose surface of the erect center hair and the smooth-walled arching hairs surrounding it, $\times 50$; 8. Mature pistil showing the glabrous recurved style and hirsute ovary, $\times 18$; 9. Para-sagittal section of the ovary showing the two pendant anatropous ovules, $\times 18$; 10-12. Lateral, abaxial, and adaxial views of the stamens taken from a bud, $\times 13$; 13-15. Adaxial, abaxial, and lateral views of the stamens from an opened flower; note the broad connective with the anther sacs diverging from the top, $\times 11.5$.

GRAY HERBARIUM,
HARVARD UNIVERSITY.

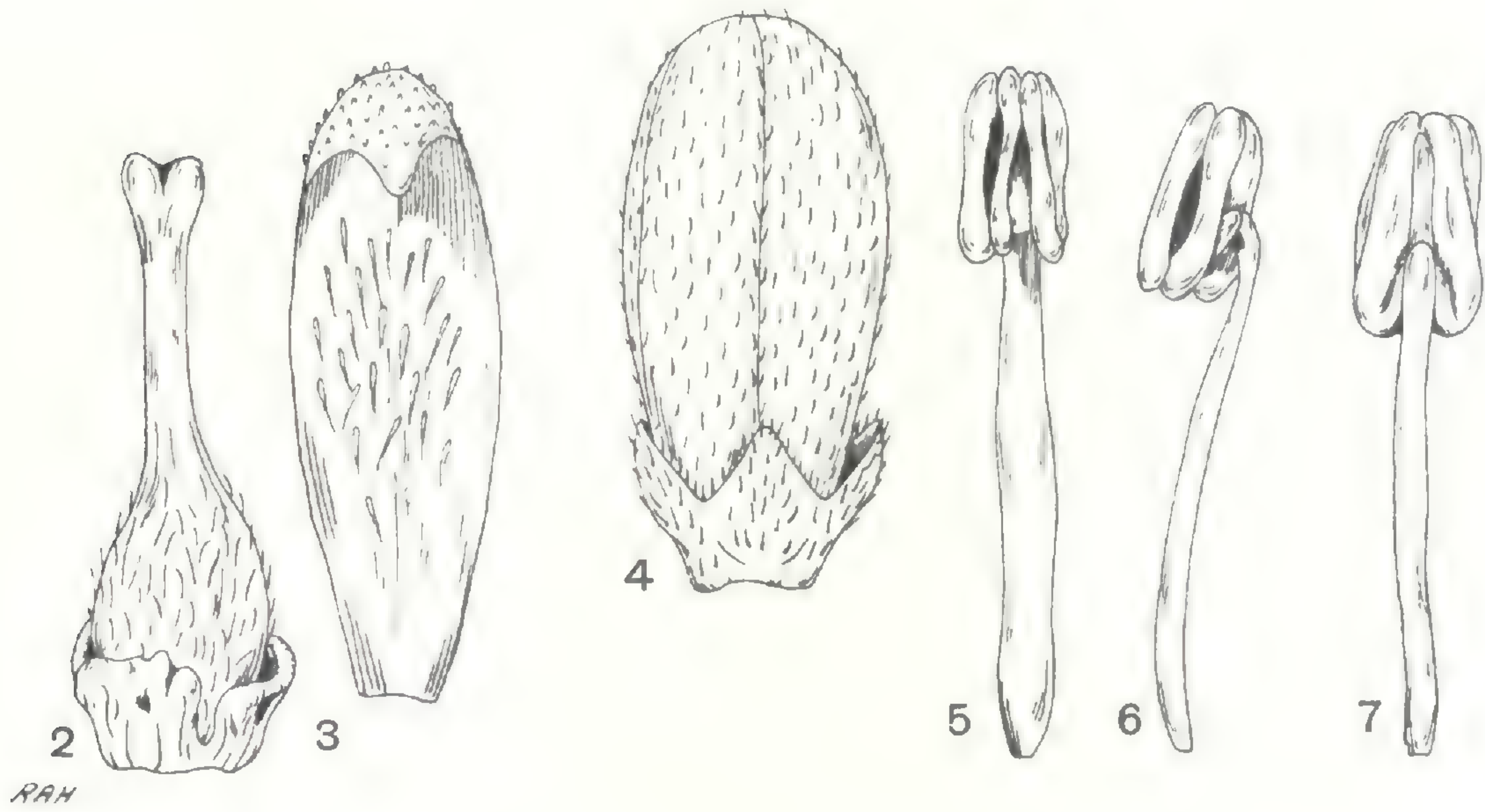


STUDIES OF THE ICACINACEAE, II



RAH

STUDIES OF THE ICACINACEAE, II



STUDIES OF THE ICACINACEAE, II



STUDIES OF THE ICACINACEAE, II

SOME PAPUAN MYRTACEAE*

C. T. WHITE

*With one plate*1. CAPSULAR-FRUITED MYRTACEAE
(MYRTACEAE-LEPTOSPERMOIDEAE)***Metrosideros* Banks*****Metrosideros ornata* sp. nov.***Metrosideros* sp. No. 264, Lane-Poole, For. Res. Terr. Papua and N. Guin. 128. 1925.

Arbor ad 16 m. alta, trunco ca. 33 cm. diam., cortice lepidoto flavo-fulvo ("yellow-brown" — fide Lane-Poole), ramulis velutino-pubescentibus, juvenilibus quadrangularibus. Folia obovato-lanceolata, apice breviter et obtuse acuminata, basi in petiolum gradatim angustata, supra glabra, subtus velutino-fulvo-tomentosa, margine leviter recurva, costa media supra leviter impressa, subtus valde elevata, nervis lateralibus crebris, parallelis sed utrinque plus vel minus obscuris; lamina 2.5–3.5 cm. longa, 0.6–1 cm. lata; petiolus ca. 2 mm. longus. Cymae terminales, ramulis angularibus dense pubescentibus. Flores rubri pedicellati, pedicellis 2.5 mm. longis. Calyx campanulatus, 6 mm. diam., lobis 5 rotundatis 2.5 mm. diam. Petala rotundata, 3.5 mm. diam., margine ciliolata. Stamina ca. 10, 1.2 cm. longa. Ovarium glabrum, 4-loculare, a calyce liberum.

BRITISH NEW GUINEA: Trail from Kokoda to the Gap, alt. 1600 m., *Lane-Poole* 264 (fl.), Aug. (small tree, 3 ft. girth, 50 ft. high; bark yellow-brown, scaly, the wood yellow, deepening to dark yellow or light brown; flowers scarlet).

Lane-Poole (l.c.) states, "The most ornamental tree I have seen in Papua. The dark green myrtle foliage and the scarlet flowers make a contrast which is most beautiful. The scarlet crowns can be picked out across wide valleys in these mountains."

***Metrosideros parallelinervis* sp. nov.**

Arbor ad 23 m. alta, trunco 52 cm. diam., cortice lepidoto, ligno rubro (fide Brass), ramulis junioribus dense sericeo-pubescentibus demum glabris. Folia ovato-lanceolata, juniora utrinque sericea demum glabra, apice longe et gradatim acuminata, basi subcuneata, supra subnitida, subtus pallidiora et opaca, nervis lateralibus supra obscuris, subtus prominulis subparallelis, crebris, vena marginali subtus prominula; lamina 3.5–5 cm. longa, 1–1.5 cm. lata; petiolus 2–3 mm. longus. Cymae axillares, 7–9-florae, 1.2 cm. diam., ramulis calycibusque dense albo-hirsutis. Calyx late campanulatus, 2.5 mm. diam., profunde 5-lobatus, lobis late triangularibus 1 mm.

*(Botanical Results of the Richard Archbold Expeditions) In addition to the plants collected on these expeditions, I have here described two others based on material in the Queensland Herbarium. Types of all species here described are deposited in the Queensland Herbarium and duplicates are in the Herbarium of the Arnold Arboretum.

altis. Petala flava, late et breviter ligulata, 2 mm. longa, margine ciliolata. Stamina ca. 15, filamentis leviter applanatis, 4 mm. longis, antheris parvis glandula magna ornatis. Ovarium a calyce liberum, hirsutum, triloculare.

NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, alt. 950 m., frequent tree of mossy forest, on slope of ridge, *Brass 13149* (fl. and very young capsules), Mar. 1939 (tree 23 m. high, 52 cm. diam.; bark brown, scaly; wood red; fls. yellow; fruit yellow-green); same locality, alt. 900 m., very abundant as a subsidiary tree in *Agathis* forest, *Brass 13291* (TYPE: flowers) Mar. 1939 (tree up to 20 m. high, 30 cm. diam.; fls. yellow).

Among previously described species, the present one has the closest affinities with *M. Pullei* Diels, which differs in having shorter broader leaves, subterminal many-flowered cymes, and larger flowers.

***Metrosideros parviflora* sp. nov.**

Arbor ad 35 m. alta, partibus novellis dense sericeo-pubescentibus, ramulis subrobustis. Folia petiolata juvenilia manifeste discoloria, subtus albicantia, dense et minute punctata; adulta in sicco supra subnitida, subtus pallidiora et opaca, lanceolata, apice obtuse acuminata, basi cuneata, costa media supra impressa, subtus elevata, nervis lateralibus supra obscuris, subtus opacis; lamina 6–7 cm. longa, 1.5–2 cm. lata; petiolus 5 mm. longus. Flores parvi, flavi. Cymae terminales vel subterminales densiflorae, ramulis sericeo-hirsutis. Calyx late campanulatus, tenuiter sericeus, 4 mm. diam., lobis ovato-triangularibus, 1 mm. altis. Petala late ovata, 3 mm. longa, basi 2 mm. lata. Stamina ca. 20, petala vix aequantia, filamentis leviter applanatis, antheris parvis, apice glandula magna ornatis. Ovarium triloculare a calyce liberum, dense pilosum, apice subplanum. Capsula oblonga, 3 mm. longa.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, alt. 1300 m., rare on slopes in primary rain-forest, *Brass & Versteegh 12570* (TYPE: flowers), Feb. 1939 (tree 35 m.; flowers yellow); 2 km. sw. of Bernhard Camp, Idenburg River, alt. 750 m., occasional tree on ridges in primary forest, *Brass & Versteegh 13516* (capsules), Mar. 1939 (tree 23 m. high).

Among previously described species, the present one is most closely allied to *M. Pullei* Diels, which differs in having smaller relatively broader subovate leaves, narrower (linguiform) petals, and shortly exserted stamens.

***Metrosideros Pullei* Diels in Bot. Jahrb. 57: 417. 1922.**

NETHERLANDS NEW GUINEA: Bele River, 18 km. ne. of Lake Habbema, alt. 2250 m., frequent in seral forest, *Brass & Versteegh 11104* (fls. and unopened capsules), Nov. 1938 (tree 19 m. high, 41 cm. diam., with small crown; bark 3 mm. thick, scaly; outer wood white, inner dark red; flowers yellow; fruit green); Balim River, alt. 2160 m., forested slopes, *Brass & Versteegh 11184* (fl.), Dec. 1938 (tree 21 m.; fls. yellow); 18 km. sw. of Bernhard Camp, Idenburg River, alt. 2050 m., frequent tree of primary forest, on ridge, *Brass & Versteegh 12503* (fls. and capsules), Feb. 1939 (26 m. high, 41 cm. diam.; bark brown, scaly; fls. yellow; fruit brown).

I have not seen authentic material of *M. Pullei* Diels, and the determination is made from the description only. The present specimens have slightly larger leaves than the type (the only specimens quoted by Diels, l.c.) but otherwise seem to agree.

***Metrosideros Pullei* Diels var. *parvifolia* var. nov.**

Folia ovata, apice acuta, basi subcuneata; lamina 1–1.5 cm. longa,

0.5–0.7 cm. lata; petiolus 1 mm. longus. Calyx 2.5 mm. diam. Petala 2.5 mm. longa.

NETHERLANDS NEW GUINEA: 18 km. sw. of Bernhard Camp, Idenburg River, alt. 2200 m., common on ridges in primary forest, *Brass & Versteegh 11999* (TYPE: flowers), Feb. 1939 (tree 21 m.; fls. yellow); 15 km. sw. of Bernhard Camp, Idenburg River, alt. 1800 m., very common subsidiary tree in mossy forest, *Brass 12007* (tree up to 20 m. high and 30 cm. diam.).

Mearnsia Merrill

Mearnsia cordata White & Francis, Proc. Roy. Soc. Queens. **39**: 67. *pl. 5, fig. 1*. 1928.

NETHERLANDS NEW GUINEA: Southern slopes of Balim Valley, alt. 2000 m., abundant in scrubs of *Vaccinium* and *Rhododendron*, on poor sandy soil, *Brass 11603* (capsules), Dec. 1938 (tree 3–4 m. high); Balim River, alt. 2000 m., in *Vaccinium* scrub on poor sandy soil, *Brass 11757* (fl. buds), Dec. 1938 (tree or shrub 3–4 m. high, fl. buds red); Bernhard Camp, Idenburg River, alt. 2150 m., in mossy forest, plentiful in the low scrub of an exposed summit and as a subsidiary tree in the forest, *Brass 12720* (old capsules), Feb. 1939 (3–8 m. high); 6 km. sw. of Bernhard Camp, Idenburg River, alt. 1200 m., *Brass 12916* (old capsules), Feb. 1939 (common epiphytic tree up to 15 m. high).

Mearnsia ovata sp. nov.

Metrosideros Regeli F. M. Bailey, Proc. Roy. Soc. Queens. **18**: 2. 1940, non F. Muell.

Frutex scandens, glaber, ramulis robustis juvenilibus quadrangularibus. Folia opposita, late ovata, subcoriacea, 2–2.5 cm. longa, 1.3–1.5 cm. lata, margine leviter revoluta, apice obtusa, basi sed cordata, supra subnitida, subtus opaca et distincte pallidiora et in sicco rubescentia, venis lateralibus ca. 12 in utroque latere in venam marginalem 0.25 mm. remotam conjunctis, supra prominulis, subtus visibilibus sed vix prominulis; petiolus 1 mm. longus. Flores fasciculati ex axillis foliorum delapsorum e ligno vetere. Pedicelli 2 mm. longi, tenues, glabrescentes. Calycis tubus turbinatus glabrescens, 2 mm. longus, lobis triangularibus vix 1 mm. longis. Petala rubra, orbicularia, 2 mm. diam., basi in unguem angustata, stamina uniseriata, rubra, 1 cm. longa. Ovarium immersum, triloculare; stylus 1.3 cm. longus.

BRITISH NEW GUINEA: Mt. Yale District, alt. 600 m., *F. R. Barton* (creeper growing up high forest tree, with very brilliant blossom).

Mearnsia scandens sp. nov.

Frutex scandens, partibus novellis pilis sericeis dense obsitis mox glabris, ramulis validis. Folia opposita, lanceolata vel angustissime obovata, subcoriacea, margine leviter revoluta, apice obtusa vel subobtusa, basi in petiolum validum angustata, supra subnitida, subtus opaca et leviter pallidiora, venis lateralibus ca. 14 in utroque latere in venam marginalem 0.25 mm. remotam conjunctis, supra obscuris, subtus prominulis; lamina 2.5–3.5 cm. longa, 0.8–1.2 cm. lata; petiolus 2 mm. longus. Flores fasciculati ex axillis foliorum delapsorum e ligno vetere. Pedicelli pilis albis sparsis obsiti, 3 mm. longi. Calycis tubus late turbinatus, 2 mm. longus, 4 mm. diam., subangularis, in parte inferiore pilis albis sparsissime obsitus, lobis late triangularibus. Petala rubra, orbicularia, 3 mm. diam., basi in unguem angustata. Stamina uniseriata, rubra, 1.7 cm. longa. Ovarium immersum, loculis 3; stylus ruber 2 cm. longus.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction of Black River, alt. 100 m., common in ridge forests, *Brass 7062* (fls.), June 1936 (very showy canopy climber; stem free, covered with brown fibrous bark; branches climbing by adventitious

roots; leafy and flowering branches stiff, shrubby; calyx green; other parts of flower bright red).

Xanthostemon F. Muell.

Xanthostemon crenulatus sp. nov.

Arbor 10–18 m. alta, cortice fibroso-suberoso-lepidoto; ramulis validis, pubescentibus. Folia subopposita, oblonga, basi obtusa vel subobtusa, coriacea, margine undulato-crenulata, nervis lateralibus ca. 12, in sicco cum costa utrinque subprominentibus, venis reticulatis utrinque prominulis, lamina utrinque glabra, 7–11 cm. longa, 5–7.5 cm. lata; petiolus tomentosus, 5–6 mm. longus. Inflorescentiae terminales, densiflorae, ramulis dense tomentosis. Flores albo-virides, longe pedicellati, pedicellis tomentosis, 5–7 mm. longis vel (*Brass* 8473) ad 1.4 cm. longis. Calyx dense velutino-tomentosus, late campanulatus, 5 mm. diam., lobis 5 distantibus, 1.5 mm. altis. Petala 5, ovata, 2 mm. longa, dense tomentosa, basin versus in unguem plus vel minus constricta. Stamina numerosa, 7–9 mm. longa, filamentis glabris. Pistillum glabrum, stylo vix 1 cm. longo. Capsula basi lata adnata, caeterum libera, subglobosa, 3–4-locularis, 7–8 mm. diam., semina compresso-navicularia 5–6 mm. longa.

BRITISH NEW GUINEA: Wuroi, Oriomo River, alt. 10–30 m., common savannah tree, *Brass* 5805 (capsules), Jan. 1934 (dense foliaged, rather heavy boled tree, 10–12 m. high, with contorted branches; bark grey, thick, soft, and corky; wood hard, reddish; leaves pale); Gaima, Lower Fly River (east bank), savannah forest, plentiful on sandy soil, *Brass* 8358 (TYPE: flowers), Nov. 1936 (tree 16–18 m. high; bark soft, fibrous-suberose, scaly; leaf-margins wrinkled; fls. greenish); Penzara, between Morehead and Wassi Kussa Rivers, abundant on savannah forest ridges, *Brass* 8473 (fl.), Dec. 1936 (tree 10–12 m.; bark soft, fibrous, scaly; fls. greenish-white); Upper Wassi Kussa River (left branch), savannah forests, common tree, *Brass* 8602 (fls.), Jan. 1937.

The species now proposed is very closely allied to *X. oppositifolius* F. M. Bailey, which has a very limited distribution in southeastern Queensland. It is probably the species referred to by Lauterbach as *X. spec. aff. oppositifolius* Bailey, in *Nova Guinea* 8: 854. 1910, from Merauke River, Netherlands New Guinea.

The two species can be distinguished as follows:—

Leaf-blades 5–9 cm. long, 3–6 cm. broad, margins not distinctly undulate-crenulate; inflorescence few-flowered; calyx 1 cm. diam. at the top (in flower); capsule 1.2 cm. diam.	<i>X. oppositifolius</i> .
Leaf-blades 7–11 cm. long, 5–7.5 cm. broad; margins distinctly undulate-crenulate; inflorescence many-flowered; calyx 5 mm. diam. at the top (in flower); capsule 7–8 mm. diam.	<i>X. crenulatus</i> .

Xanthostemon papuanus Lauterb. in *Nova Guinea* 8: 854. 1910.

NETHERLANDS NEW GUINEA: Hollandia and vicinity, alt. 20–100 m., abundant on dry deforested slopes covered with grass and fern, old seral rain-forest, *Brass* 8801 (fls. and young fr.), June–July 1938 (small tree 15–17 m.; fls. red).

I had drawn up a description of these specimens as a new species, but now consider them to be conspecific with Lauterbach's plant, of which, unfortunately, I have not seen an authentic specimen. The present ones differ from the description in the leaves being scattered, not crowded towards the ends of the branches, the venation I should say obscure rather than slightly prominent, and the stamens being red, not yellow. This last, however, is a

very variable feature in some myrtaceous genera, especially in the allied ones, *Melaleuca* and *Callistemon*.

Xanthostemon paradoxus F. Muell. in Hook. Kew Jour. 9: 18. 1857; Fragm. Phytogr. Austr. 1: 80. 1859

BRITISH NEW GUINEA: Dagwa, Oriomo River, common savannah forest tree, *Brass* 5932 (old capsules), Feb.-Mar. 1934 (rather crooked tree, 12-15 m., with thick leafy crown of stiff branches, thick scaly bark, and hard reddish wood; leaves somewhat glaucous); Mabaduan, common in savannah forests, *Brass* 6556 (old capsules), April 1936 (stiffly branched tree 12-14 m. high; bark dark brown; leaves clustered at ends of branchlets); Lake Daviumbu, Middle Fly River, plentiful in rain-forest outskirts in contact with savannahs, *Brass* 7503 (fls. and fr.), August 1936 (tree 30 m.; bark dark grey, hard, fissured, early deciduous; flowers yellow, appearing a few days before the leaves fall); same locality and date, *Brass* 7869 (fl. and young lvs.), Sept. 1936; Tarara, Wassi Kussa River, abundant on savannah forest ridges and entering rain-forests, *Brass* 8575 (old capsules), Dec. 1936 (tree up to 30 m. high with dark fissured bark).

This species was originally collected by Mueller himself in Arnhem's Land. Mr. F. J. Rae kindly forwarded the type gathering on loan. This consists of two sheets, both very scrappy and not quite identical. Apparently the original description was drawn up from both. The species is as yet very imperfectly known in Australia, but I should consider all the above Papuan specimens to come under it (*sens. lat.*).

Tristania R. Br.

Tristania ferruginea sp. nov.

Arbor 30 m. alta vel ultra, cortice tenui fibroso, ligno fusco duro (fide Brass), partibus junioribus densissime ferrugineis, vetustioribus glabris. Folia coriacea, obovata, apice obtusa vel emarginata, basi in petiolum longum angustata, supra nitida, subtus pallidiora et opaca, in juventute dense floccoso-ferruginea, costa media supra impressa, subtus valde elevata, nervis lateralibus supra subobscuris in venam marginalem ca. 1 mm. remotam conjunctis; lamina 5-6.5 cm. longa; petiolus 2-2.5 cm. longus. Inflorescentiae multiflorae in axillis foliorum superiorum, in cymam terminalem ca. 8 cm. diam. dispositae, ramulis densissime ferrugineo-pubescentibus. Calyx late campanulatus, 3 mm. diam., extus in parte inferiore dense in parte superiore tenuiter ferrugineo-tomentosus, 5-lobatus, lobis late triangularibus, minute ciliolatis. Petala 5, calycis lobos paulo superantia, subrotunda. Stamina in phalanges 5 petalis oppositas 3-4-andras disposita, filamentis pilosis, petala paulo superantibus. Ovarium pilosum. Capsula subglobosa, trilocularis, 4 mm. diam., parte adnata 2 mm., libera 1.5 mm. longa.

BRITISH NEW GUINEA: Fly River, 528-mile Camp, alt. 80 m., characteristic canopy tree of ridge forest, *Brass* 6852 (detached capsules), May 1936 (tree 30 m.; foliage dense in crown, young leaves reddish; trunk deeply fluted toward the base, dark brown, fibrous; wood dark brown, hard and tough); Palmer River, 2 miles below junction of Black River, alt. 100 m., dominant tree of ridge forests, *Brass* 7168 (TYPE: flowers) (over 30 m.; branches semi-erect, forming a thick rounded crown; tree spurred at the base; older trees deeply fluted; bark thin, fibrous; wood hard, brown, very durable; petals white).

In its markedly obovate leaves and small flowers with short few-androus phalanges, the present species is closely allied to *T. obovata* Benn., which

is, however, perfectly glabrous in all its parts, has narrower more shortly petiolate leaves, and fewer-flowered lateral and axillary inflorescences.

Tristania longivalvis F. Muell. in Wing, South Sc. Record, n.s. **2**: April 1886.

BRITISH NEW GUINEA: Western Division, Wuroi, Oriomo River, common savannah tree, sometimes within light rain-forest, *Brass* 5754 (fls.), Jan.-Mar. 1934 (clear-boled slender tree of upright branching habit, with brown flaky fibrous bark and hard wood; fls. bright yellow); Mabaduan, savannah forests, not common, *Brass* 6544 (fls.), Apr. 1936 (tree 10-15 m., with thin gray laminated fibrous bark; fls. bright buttercup-yellow); Tarara, Wassi Kussa River, abundant, forming bushy forests on clay ridges along river, *Brass* 8530 (fls.), Dec. 1936 (tree 12-15 m., fls. yellow).

These specimens have more lanceolate narrower leaves than all the Australian ones I have seen, but otherwise seem inseparable.

Tristania suaveolens Smith in Rees, Cyclop. **36**: no. 2. 1817.

BRITISH NEW GUINEA: Western Division, Wuroi, Oriomo River, *Brass* 5900 (fr.), Jan.-Mar. 1934; Dagwa, Oriomo River, common savannah forest tree, *Brass* 5972 (fr.), Feb.-Mar. 1934 (leaves greyish underneath, the midrib and nerves yellowish above); Daru Island, common on drier soils in savannah forests, *Brass* 6327 (fls.), Mar. 1936 (tree about 15 m. tall, usually leaning and misshapen; bark brown, fibrous, flaky; fls. white); Lake Daviumbu, Middle Fly River, forming pure fringe forests 20-25 m. high, extending to less arid savannahs, *Brass* 7792 (fls.), Sept. 1936 (bark laminated, fibrous, reddish brown; fls. white); Tarara, Wassi Kussa River, ridges of savannah forests, *Brass* 8401 (fls.), Dec. 1936 (25 m. or more; bark brown, fibrous, laminated and fissured; fls. white); Tarara, Wassi Kussa River, savannah forest, one of the principal trees on the ridges, *Brass* 8537 *bis* (fls.), Dec. 1936 (attaining 30 m.).

***Basisperma* gen. nov.**

(Tribus Leptospermeae: Subtribus Metrosidereae)

Flores hermaphroditi. Calycis tubus late campanulatus vel explanatus, limbo prominente 5-dentato. Petala 5, patentia. Stamina numerosa, pluri-seriata, petalis breviora, in phalanges 5 petalis oppositas plus vel minus connata, filamentis filiformibus, antheris minutis versatilibus, loculis parallelis longitudinaliter dehiscentibus. Ovarium superum, biloculare. Stylus filiformis, stigmatate minute capitato; ovula in loculis numerosa, in placenta basilari erecta. Capsula subglobosa, latere saepe compressa; valvae coriaceae vel sublignosae, intus semisepto medio notatae; semina perfecta, pauca, magna, testa subcarnosa; semina abortiva numerosa oblonga parva. Arbor. Folia alterna, opposita vel ternatim verticillata, lanceolata, pennivenia. Flores in cymas axillares pedunculatas bracteolatas dispositi.

Species 1 in Papua crescens.

Basisperma lanceolata sp. nov.

PLATE I.

Arbor 7-8 m. (fide Brass), partibus novellis sericeis, ramulis junioribus quadrangulatis. Folia alterna, opposita vel ternatim verticillata, lanceolata, apice acuta, basi cuneata in petiolum gradatim angustata, supra glabra, subtus argentea, sericeo-tomentosa; nervi praecipui ca. 30 in utroque latere, in sicco utrinque prominuli, in venam intramarginalem 0.5 mm. remotam conjuncti; petiolus 5-7 mm. longus, lamina 8-9 cm. longa, 2-2.5 cm. lata. Cymae axillares, ca. 1.5 cm. diam., bracteolis pedunculis ramulis pedicellis-que sericeis; bracteolae paucae lanceolatae 1-2 mm. longae, pedunculi 1-1.5 cm. longi; pedicelli 2-3 mm. longi. Calyx sericeus, late campanulatus, sub

fructu explanatus, ca. 6 mm. diam., limbo prominente 5-dentato, dentibus triangularibus 1 mm. altis. Petala 5, oblonga (?). Stamina in phalanges 5 petalis oppositas ca. 12-andras disposita, filamentis petalis brevioribus. Capsula aurantiaca (fide Brass) subglobosa, ca. 7 mm. diam., valvae coriaceae vel sublignosae, intus nitidae, semi-septo medio notatae; semina perfecta pauca (1-3), rubra, testa subcarnosa in sicco rugulosa; semina imperfecta oblonga, 1 mm. longa.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, common in rain-forest along river, *Brass* 8377 (fruit), Dec. 1936 (tree 7-8 m.; fruit orange-yellow; seeds red).

The generic name refers to the basal position of ovules and seeds. The closest affinities of *Basisperma* are, I think, with *Tristania* R. Br., which differs in having the ovary trilocular and adnate to the calyx, even though it may be only at the base, the ovules being pendent or horizontal, not basal and erect, and the seeds being dry, small, and frequently winged at one end.

The single specimen originally sent to me was in fruit only, and a careful search failed to reveal any flower fragments that might assist in identification. The wholly superior bilocular *Pittosporum*-like capsule, with basal placentation, made me doubt whether it was actually myrtaceous. A specimen sheet, which by good fortune contained the remains of a flower, was sent to Prof. Irving W. Bailey for examination, and he concluded that the plant agreed with Myrtaceae in the following respects: leaf venation; absence of stipules; a unilacunar node; large oil glands in pith cortex, leaf, flower, and fruit; structure of the internal phloem; presence of simple thick-walled unicellular hairs; possession of concentric rings of hard bast; structure of vessels, tracheids, parenchyma and rays; abundance of tannin; and structure of the pollen. The only disagreement with Myrtaceae was the superior ovary. In his report on the plant, Prof. Bailey wrote: "I was able to examine the pollen and flower due to the keen eyes of my assistant Heintzelman, who spotted a dried-up petal that was attached to one of the fruits by the hyphae of a fungus. Attached to the base of this deciduous petal were about 12 stamens. Each stamen has a large oil gland at the apex of the anther. The structure of the flower appears to have been as shown in the somewhat diagrammatic sketches on the accompanying plate."

Later, Dr. Perry searched through the duplicate material of this number collected by Brass and sent me a flower fragment similar to that seen by Prof. Bailey. The above description has been drawn up from this material. It is hoped that additional flowering specimens may be available later, to enable a more complete account of the new genus to be made.

Eucalyptus L'Her.

(Determinations by W. F. Blakely, Botanic Gardens, Sydney)

Eucalyptus clavigera A. Cunn. ex Schauer in Walp. Rep. **2**: 926. 1843.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, savannah forests, localized on well drained soils, not very common, *Brass* 8568 (fls. and old capsules), Dec. 1936 (conspicuous tree up to 25 m. high, 0.6 m. girth; lower stem

grey-black, scaly; bark of upper stem smooth, yellowish grey; branchlets weak, often pendent).

Eucalyptus papuana F. Muell. Descript. Notes Pap. Pl. 1: 8. 1875.

BRITISH NEW GUINEA: Western Division, Daru Island, savannahs in centre of the island, rare, *Brass 6054* (fr.), Mar. 1934 (tree up to 10 m.; base of trunk rough; upper trunk and branches smooth, greenish grey).

A form with very constricted fruits.

Eucalyptus tereticornis Sm. Bot. New Holl. 41. 1793.

BRITISH NEW GUINEA: Western Division, Dagwa, Oriomo River, alt. 40 m., savannah forest ridges, rare, *Brass 5947* (fls.), Feb.-Mar. 1934 (open-crowned tree attaining 15 m.; branchlets somewhat pendent; bark of trunk pale ash-grey, furrowed and fissured, 1-1.2 cm. thick on tree 22 cm. diam.; bark of branches grey or blue-grey, smooth, exfoliating in long folded strips; fls. white; capsules about 1 cm. diam. across the rim); savannah forest, a number of trees in an isolated patch, uncommon, *Brass 6004* (fls.), Feb.-Mar. 1934 (tree of open erect branching habit, about 15 m. high; branchlets weak; lower half of trunk covered with rough grey furrowed bark; bark of upper trunk and branches smooth, blue-grey, peeling in long folded strips; leaves pale; fls. white; operculum waxy creamy white; pedicels angled), *Brass 6005* (same with very young fr.); Wuroi, Oriomo River, alt. 10-50 m., savannah forests, uncommon, *Brass 6020* (fls. and fr.), Jan.-Mar. 1934 (tall unshapely tree, attaining 25 m. or more; lower trunk bark persistent, dark grey, rough, shallowly fissured; upper trunk and branches smooth, blue-grey); Daru Island, plentiful in savannah forests, *Brass 6428* (fr.), Apr. 1936 (tree about 25 m.; trunk on lower part with fibrous rough-grey bark, exfoliating in long irregular pieces about 3 mm. thick; bark of branches smooth, bluish grey); Tarara, Wassi Kussa River, subsidiary to *E. terminalis* on savannah forest ridges, *Brass 8402* (fr.), Dec. 1936 (slender tree, 15 m.; bark on stem fissured, scaly, on branches smooth, grey; young leaves glaucous beneath; fls. not seen); savannah forest, fairly common ridges, *Brass 8719* (fls. and fruits), Jan. 1937 (tree about 20 m.; bark dark, rough, hard, fissured; bark on branches smooth, grey; fls. white).

Mr. Blakely, in his "Key to the Eucalypts," 130 (1934), adopts the combination *E. umbellata* (Gaertn.) Domin for this species. Prof. Osborn (Proc. Linn. Soc. N.S.W. 62: 76. 1937), however, has pointed out that the combination is untenable due to the earlier publication of *E. umbellata* Dum.-Cours. The Papuan specimens have a more robust appearance than the common Australian form, and Mr. Blakely remarks that they represent "the tropical and probably a very old form of the species."

Eucalyptus terminalis F. Muell. in Jour. Linn. Soc. 3: 89. 1859

BRITISH NEW GUINEA: Western Division, Dagwa, Oriomo River, rare in savannah forest, *Brass 5970* (fl. buds and old capsules picked up under trees), Feb.-Mar. 1934 (large thick-trunked tree attaining 25 m. with trunk diam. of 60 cm.; branches wide-spreading and sparsely foliated; bark averaging about 1.8 cm. on a trunk 60 cm. diam. pale brown, soft, shortly fibrous, scaly; wood hard and heavy; sapwood pale; inner wood reddish; leaves greyish beneath; veins more conspicuous above; fl. buds and pedicels scabrid, silver grey); Daru Island, common savannah tree, *Brass 6048* (fls.), Mar. 1934 (large, thick-trunked tree with grey-brown, soft, fibrous and somewhat scaly bark; petioles and young branches red; leaves greyish beneath; profusion of large white flowers); Mabaduan, abundant in canopy layer of savannah forest, *Brass 6557* (fls.), Apr. 1936 (tree 15-18 m.; stem straight, cylindric; heavy spreading branches, forming flattish crown; bark pale brown, fibrous, soft and brittle; wood hard, heavy, reddish brown; fls. white), a rather coarse-budded form; Tarara, Wassi Kussa River, savannah forests, locally abundant on well drained soil, *Brass 8746* (very young buds and old fr.), Jan. 1937 (tree up to 25 m., 0.6-0.7 m. diam.; bark thick, soft, fissured, fibrous, brown).

Agonis DC.

Agonis lysicephala (F. Muell. & F. M. Bailey) F. M. Bailey, Synopsis Queens. Fl. Suppl. **2**: 37. 1891; Francis and White, Proc. Roy. Soc. Queens. **37**: 158. 1926.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, plentiful on lower savannah ridges, *Brass* 7797 (fl. and capsules), Sept. (very slender tree 1.5–3 m.; coppice shoots produced from a thickened stock when aërial parts are killed by fires; fls. white); Lower Fly River, savannah areas, common about edges of swamp, *Brass* 8357 *bis* (fl. and capsules), Nov. (shrub 1 m. high; fls. white); Tarara, Wassi Kussa River, abundant on grey flats of savannah forest, *Brass* 8382 (fls. and capsules), Dec. (shrub less than 1 m. high); same locality, *Brass* 8709 (forming dense scrubs 2–3 m. high, fls. white).

Melaleuca L.

Melaleuca Cunninghamii Schauer in Walp. Rep. **2**: 927. 1843.

Melaleuca Leucadendron L. var. *sanguinea* Cheel in Ewart and Davies, Fl. North. Terr. 296. 1917.

Melaleuca Leucadendron L. var. *Cunninghamii* Cheel, l.c. 297.

BRITISH NEW GUINEA: Wuroi, Oriomo River, very abundant in grey soil ridges, *Brass* 5695 (fls.), Jan.-Mar. 1934 (contorted, sparsely foliated low tree, with thin, somewhat fibrous papery bark; petioles red; fls. red); dominant species in low and often rather scrubby savannah on grey soil ridges, *Brass* 5714 (fls.), Jan.-Mar. (low, loosely branched, sparsely foliated tree 4–6 m., with somewhat fibrous, laminated grey bark; fls. red); Daru Island, low swampy land about middle of island, common, *Brass* 6036 (fls.), Mar. (rather crooked small tree, 8–10 m., with grey papery bark; petioles red; flowers numerous, greenish white); Lake Daviumbu, Middle Fly River, savannahs, forming low scrubs on acid soils, *Brass* 7794 (fls.), Sept. (tree 3–6 m.; bark laminated, papery; fls. red); Western Division, Mabaduan, abundant in savannah forests as sub-stage tree, *Brass* 6558 (fls.), Apr. (tree 6–8 m. high; branches stiff, contorted; bark grey in paper-like layers; wood reddish, dark, heavy; occasional on savannah ridges, *Brass* 7937 (fls.), Sept. (low tree 3–4 m.; fls. greenish white); sour savannah slopes, *Brass* 7938 (fls.), Sept. (about 1 m. high, branched or unbranched; fls. pink); common on sour savannah slopes, *Brass* 7939 (fls.), Sept. (variable dwarf form, branched or unbranched, about 1 m. high; fls. various shades of red); Penzara, between Morehead and Wassi Kussa Rivers, poorly drained flats of savannah forest, *Brass* 8478 (fls.), Dec. (tree 5–7 m.; fls. red); Tarara, Wassi Kussa River, plentiful in low scrubs, dominated by *Agonis*, *Brass* 8710 (fls.), Jan. (sparsely branched stiff tree 1.5–2.5 m.; fls. pink to red).

Melaleuca Cunninghamii Schauer is a common tree in North Australia and southern Papua. It occurs in two main colour forms, one with flowers a deep blood red, the other with flowers a greenish-white, with an occasional intermediate form with pink flowers (*Brass* 7938 and 8710) or various shades of red (*Brass* 7939).

Colour is an extremely variable feature in both *Melaleuca* and *Callistemon*. Cheel, in a valuable study of the North Australian species of *Melaleuca* (in Appendix II of the Flora of the Northern Territory by Ewart and Davies), proposes to treat both forms as separate varieties of *M. Leucadendron* L.

Melaleuca Cunninghamii Schauer var. **glabra** var. nov.

Varietas rhachi et calycibus glabris.

BRITISH NEW GUINEA: Western Division, Tarara, common in poorly drained savannah forests, *Brass* 8485 (TYPE; flowers), Dec. 1936 (crooked slender tree 5–8 m.; bark grey, papery; fls. greenish white).

AUSTRALIA: The following sheets in Herb. Kew represent this variety: Port Essing-

ton, *Gilbert* (presented by John Gould Esq.); Carpentaria, *R. Brown* 4712; N. W. Australia, *A. Cunningham* (voyage of the Beagle, 1839, marked in Cunningham's handwriting, "calyx not silky as in *M. Cunninghamii*"); N. W. coast, *Bynoe*; North coast, *A. Cunningham*; E. C. Australia, *A. Cunningham*; Wednesday Island, Torres Straits, *Moseley, Challenger Exped.* 9174. It is represented in Herb. Brisbane by the following: Stannary Hills, *T. L. Bancroft*; Frewhurst, Etheridge Railway, *C. T. White* 1369 (fls.), Feb. 1922; near Chillagoe, forming open communities in damper places on grey, sandy soil, *S. T. Blake* 13565 (fls.), Apr. 1938 (slender erect or somewhat weeping tree, 15–20 ft., with compact whitish, scarcely papery bark; leaves rather yellowish green; flowers pale greenish).

Melaleuca Leucadendron L. Mant. 105. 1767.

BRITISH NEW GUINEA: Western Division, Daru Island, common in low savannah in centre of island, *Brass* 6041 (fls.), March 1934 (tree 20–25 m., with straight stout trunk and whitish papery bark; peduncles and calyces glabrous; petals and stamens white; style green).

Melaleuca Leucadendron L. vel aff. BRITISH NEW GUINEA: Lower Fly River, east bank opp. Sturt Island, forming pure swamp forests, 30–35 m. high, *Brass* 8147 (fr.), Oct. 1934 (leaves slightly glaucous; petioles red).

Melaleuca Leucadendron L., aff. BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, forming narrow fringe forests on swampy shores of lagoons, *Brass* 7956 (fr.), Sept. (tree 20 m.; petioles red).

A very distinctive plant, probably representing an undescribed species. The leaves are broadly elliptic and prominently 9-nerved, and the fruits are remarkably small. I hesitate to name it until flowers are available.

Melaleuca Leucadendron L. aff. BRITISH NEW GUINEA: Western Division, Wurci, Oriomo River, common in tall savannahs and close to rain-forest, *Brass* 5814 (fls.), Jan.-Mar. (tree about 30 m., with clear, rather slender trunk; fls. greenish white); Daru Island, extensive pure stand in shallow margins of big open swamp, *Brass* 6372 (fls.), Mar. (tree 10–12 m. tall; fls. white); Mabaduan, forming pure swamp forests, 30–35 m. high, *Brass* 8147 (fr.), Oct. (leaves slightly glaucous; petioles red).

All the above probably represent a distinct species, probably undescribed. I do not care, however, to name them until a complete revision of the *M. Leucadendron* L. series has been made, which is not possible until types in European herbaria are available for study.

Melaleuca Leucadendron L. var. *minor* Cheel in Ewart and Davies, Fl. North Terr. 299. 1917.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, subsidiary tree on savannah forest ridges, *Brass* 8407 (fl.), Dec. (6–10 m.; bark grey, laminated in papery layers; foliage grey; flowers green).

These specimens agree with what is regarded in Australia as *M. Leucadendron* L. var. *minor* Cheel, though whether this is the same as *M. minor* Sm., the type of which comes from Amboina, it is impossible to say until an examination of Smith's specimen is possible. When working at the Royal Botanic Gardens, Kew, in September 1939, I noticed a great mixture of Asiatic material under *M. minor* Sm., and this probably applies to most European herbaria.

Melaleuca sp. aff. **M. Leucadendron** L. (cf. C. T. White in Proc. Roy. Soc. Queens. 34: 46. 1922; Jour. Arnold Arb. 10: 253. 1929).

BRITISH NEW GUINEA: Gaima, Lower Fly River, the principal tree of savannah forests, *Brass* 8247 (fl.), Nov. (30 m. or more, with spreading open crown; bark grey-brown, laminated, fibrous-papery; foliage grey; fls. white; end of style green).

These specimens differ from those previously referred to by me (l.c.) in the leaves being clothed with fine silky hairs. In this respect, it is very like *M. argentea* W. V. Fitzg. of North Australia. The more glabrous specimens previously collected by Brass are almost inseparable from much material at Herb. Kew and elsewhere placed under *M. minor* Sm. The filaments are much shorter than in most other groups of the *M. Leucadendron* L. series. Unfortunately, many types are unavailable for study at present, and until the types can be studied, critical work on this difficult group is impossible.

Melaleuca symphyocarpa F. Muell. in Trans. Phil. Inst. Vic. **3**: 44. 1858.

BRITISH NEW GUINEA: Wuroi, Oriomo River, abundant on savannah ridges and in light rain-forest, *Brass* 5690 (fls.), Jan.-Mar. (straight-trunked tree, with rounded crown of upright branches attaining 25 m.; bole rather slender; bark thick, deeply furrowed, fibrous, brown; wood hard, heavy, brown, free-splitting; sapwood and inner bark surfaces finely ridged or striate; fls. bright red; most trees in full flower); Gaima, Lower Fly River (east bank), abundant in dense savannah forests, *Brass* 8295 (fls.), Nov. (erect tree 20-25 m.; bark brown, fibrous, deeply fissured; wood brown, hard, durable; fls. red); Tarara, Wassi Kussa River, savannah forest, confined to ridges, *Brass* 8533 (fls.), Dec. (tree 10-20 m.; stem cylindrical; bark grey-brown, thick, fibrous, with thick short fissures; flowers red).

Like many other melaleucas, especially those of the "*Leucadendron*" group, this species occurs in two distinct colour forms. The yellow-flowered form may be distinguished as follows:

Melaleuca symphyocarpa f. **aurantiaca** f. nov.

Flores aurantiaci.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, in poorly drained savannah forests, *Brass* 8381 (fls.), Dec. (tree 7-10 m.; branches drooping; stem fluted; bark hard, fissured; sapwood finely corrugated; fls. orange-yellow); Tarara, Wassi Kussa River, dominant over much flat savannah forest, *Brass* 8532 (fls.), Dec. (tree 7-10 m.; branches drooping; stem fluted; bark grey, fissured, fibrous, very hard; flowers orange-yellow).

Melaleuca viridiflora Sol. ex Gaertn. Fruct. **1**: 173. *tab.* 15. 1788, vel aff.

BRITISH NEW GUINEA: Tumbuke, Wassi Kussa River, *Brass* 8480 (fr.), Dec. (compact, bushy tree; bark grey, papery, laminated; no fls. seen).

These specimens are in fruit only, but agree with much *M. viridiflora* Sol. material from eastern Australia, and as understood by Cheel in Ewart and Davies, Flora of the Northern Territory, p. 299.

Baeckea L.

Baeckea frutescens L. Sp. Pl. 358. 1753.

NETHERLANDS NEW GUINEA: Balim River, alt. 2000 m., abundant on poor sandy soil, *Brass* 11838 (capsules), Dec. (slender shrub up to 1 m. high).

2. FLESHY-FRUITED MYRTACEAE (MYRTACEAE-MYRTOIDEAE)

Fenzlia Endl.

Fenzlia obtusa Endl. Atakta 19, *t.* 17. 1833.

BRITISH NEW GUINEA: Lower Wassi Kussa River, with *Dodonaea* sp. in xeric shrubberies on clay bank of river, *Brass* 8411 (leaf specimen only), Dec. 1936 (shapely shrub 1-1.5 m.); same locality, abundant on clay banks of river, *Brass* 8728 (fls. and fr.), Jan. 1937 (shrub 1-3 m.; fls. pink, later white; fr. orange-yellow).

Rhodamnia Jack

Rhodamnia cinerea Jack in Malay. Miscel. 27. 1822, sens. lat.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, rain-forest canopy tree, *Brass* 7784 (fls.), Sept. 1936 (25 m. high; trunk spurred at base; bark soft, brown, fibrous, scaly; flowers white, rose-scented); same locality, dry type rain-forests, plentiful in substage and extending to *Tristania* fringe forests, *Brass* 7791 (fls.), Sept. 1936 (bark dark grey, soft, fibrous, deeply fissured; flowers white); Gaima, Lower Fly River (east bank), common in light rain-forest and extending to savannahs, *Brass* 8289 (fls.), Nov. 1936 (bushy tree 10–12 m. high; bark rough, fissured; flowers white); Tarara, Wassi Kussa River, sporadic in savannah forests, *Brass* 8703 (fr.), Jan. 1937 (tree 7–8 m.; bark dark, fissured).

The Malayan and Papuan species of *Rhodamnia* are badly in need of revision, work that must wait for more propitious times, when types in European herbaria are again available for study.

Rhodamnia spongiosa Domin in Bibl. Bot. **89**: 1030. 1928; C. T. White in Blumea Suppl. **1**: 218. pl. 14, fig. 7. 1937.

BRITISH NEW GUINEA: Lower Fly River, east bank, opp. Sturt Island, rain-forest of dry inland ridges, *Brass* 8179 (fls.), Oct. 1936 (virgate tree; fls. white, delicately fragrant); Tarara, Wassi Kussa River, rain-forest substage or small canopy tree, *Brass* 8593 (fls.), Dec. 1936 (tree attaining 15 m.; bark grey-brown, hard, fibrous, shallowly fissured; flowers white).

Myrtella F. Muell.

Myrtella Beccarii F. Muell. Descript. Notes Pap. Pl. **1**: 106. 1877.

NETHERLANDS NEW GUINEA: Hollandia and vicinity, alt. 20–100 m., plentiful on open slopes covered with *Gleichenia* and *Ischaemum*, *Brass* 8887 (fls. and fr.), June–July 1938 (flat topped shrub 1.5 m. high; fls. white; fruit soft, black).

Mr. F. J. Rae kindly compared for me a piece of the above with the type sheet at the National Herbarium, Melbourne, and states they agree very well.

Rhodomyrtus DC.

Rhodomyrtus macrocarpa Benth. Fl. Austr. **3**: 273. 1866.

BRITISH NEW GUINEA: Western Division, Dagwa, Oriomo River, alt. 40 m., in creek bank, gallery forest, rare, *Brass* 5989 (fl. buds), Feb.–Mar. 1934 (tree 8–10 m., of compact growth; leaf-nerves deeply impressed above; flowers buds white).

Rhodomyrtus novoguineensis Diels in Bot. Jahrb. **57**: 378. 1922.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, alt. 2400 m., amongst dense scrambling bamboo in a forest clearing, rare, *Brass* 5110 (fls. and young fr.), May–Sept. 1933 (slender branched bush 2 m.; leaves pale green; fls. cream coloured). NETHERLANDS NEW GUINEA: 15 km. sw. of Bernhard Camp, Idenburg River, alt. 1800 m., occasional in mossy forest, *Brass* 12053 (fr.), Jan. 1939 (slender shrub 3 m. high); Bernhard Camp, Idenburg River, alt. 2150 m., several plants on an open rock slide, *Brass* 12455 (fr.), Feb. 1939 (very slender tree; fruit soft, yellow).

I have not seen an authentic specimen of *R. novoguineensis* Diels and the above determinations are from his description. *Brass* 5110 is very like *R. trineura* F. Muell., but the other two plants are of different appearance. It is possible that two species are represented.

Rhodomyrtus pinnatinervis sp. nov.

Frutex vel arbor parva, partibus junioribus foliis subtus pedicellis bracteolis calycibusque plus vel minus dense griseo-pubescentibus. Folia petiolata,

lanceolata, supra mox glabra, costa media supra impressa, subtus elevata, nervis lateralibus utrinque 10–12, supra leviter impressis, subtus valde elevatis; lamina 4–8 cm. longa, 1.5–2 cm. lata; petiolus 5–8 mm. longus. Flores axillares, solitarii, longe pedicellati; pedicelli 2–2.5 cm. longi; ad apicem bibracteolati; bracteolis anguste ovatis, 3–4 mm. longis. Calyx (in fructu) profunde 5-lobatus, lobis suborbicularibus 3 mm. diam. Petala alba (fide Brass), 6 mm. longa, basi unguiculata, in sicco pustulata (sed in specimine meo imperfecta). Bacca flava, 10–11 mm. diam. (fide Brass), extus dense griseo-tomentosa, in sicco ca. 8 mm. diam., multi-locularis.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, alt. 2350 m., edge of clearing in mossy forest, *Brass* 4085 (fls.), May-Sept. 1933 (bush 2–2.5 m., with upright branches; lvs. red when about to fall; flowers white); Mt. Tata, alt. 2400 m., in a small shrubbery on rest clearing in ridge forest, *Brass* 4895 (fr.), May-Sept. 1933 (bush about 1.5 m. high; old leaves red; fruit soft, yellow, 10–11 mm. diam.); same locality and habitat, common, *Brass* 4905 (TYPE: old flowers and immature fruits), May-Sept. 1933 (small tree or bush; leaves dark; young foliage grey; pedicels, calyx and fruit grey-pubescent; corolla white; fruit immature).

Among previously described species, the present one seems to agree most closely with *R. psidioides* Benth., common in southeastern Queensland, which differs in having larger, more glabrous leaves, and the flowers in cymes, not solitary in the axils.

***Rhodomyrtus trineura* F. Muell. ex Benth. Fl. Austr. 3: 272. 1866**

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, rain-forest, common in substage, *Brass* 8555 (fl.), Dec. 1936 (fls. white); same locality, substage or lesser canopy tree in rain-forest, *Brass* 8592 (fls.), Dec. 1936 (attaining 14–15 m.; bark brown, soft, fibrous, fissured, exuding a reddish gum when cut; fls. white).

These specimens represent a form with particularly long pedicels, up to 1.5 cm. long, and bibracteolate at the apex. They represent the var. *pedicellosa* F. Muell. ex White and Francis (Bot. Bull. Brisbane 22: 26. 1920).

***Rhodomyrtus calophlebia* sp. nov.**

Arbor humilis patula 4 m. alta, ramulis crassiusculis innovationibus angulatis dense fusco-pubescentibus. Folia opposita vel alterna elliptica petiolata, lamina 13–18 cm. longa, 5–9 cm. lata, utrinque gradatim angustata vel apice subabrupte acuminata, acumine 5–8 mm. longo, utrinque costa nervisque primariis parce consperseque pubescentibus exceptis glabra, manifeste reticulata minute pustulata, costa subtus elevata, nervis primariis prominulis utrinsecus 12–15 oblique patentibus in venam intramarginalem prominulam 0.8–1 cm. a margine confluentibus, juxta marginem cum venula minore parallelam, petiolo 2.5 cm. longo. Flores non visi. Bacca ut videtur axillaris solitaria subsessilis, pedunculo 2–3 mm. longo, ovoidea, basi bibracteata (bracteis linearibus 4 mm. longis 1 mm. latis obtusis), breviter stipitata 3.5 cm. longa 2 cm. diametro extus dense fusco velutina, seminibus numerosis in acie dupla superpositis.

BRITISH NEW GUINEA: Central Division, Rona, Laloki River, alt. 450 m., on bank of a small stream in rain-forest, only one tree seen, *Brass* 3600 (fruit), April 1933 (low spreading tree, 4 m.; leaves dull; fruit pale brown, solitary in axils of the leaves).

The above plant, I think, is referable to *Rhodomyrtus* and is very similar to *R. macrocarpa* Benth. The leaves are opposite and alternate, which is

rather unusual in the Myrtoideae, and their venation is striking, though of a type common in the family. The fruits have the same structure as those of *R. macrocarpa* Benth.

BOTANIC GARDENS,
BRISBANE, AUSTRALIA.



BASISPERMA LANCEOLATA C. T. WHITE

NEW BAMBOOS, AND SOME NEW RECORDS, FROM
FRENCH INDO-CHINA¹F. A. McCLURE²

Six species are described as new; one earlier description emended. Four of the new species are from a lot of 17 numbers of bamboos (comprising 12 species in six genera) included in a general collection made under the joint auspices of Lingnan University and the Arnold Arboretum by W. T. Tsang between May and October, 1940. The bamboos in this collection were all gathered in the vicinity of Sai Wong Mo Shan, Hoi Ning Province, east-central Tonkin.

The types of the new species from Tsang's collections are to be deposited in the herbarium of the Arnold Arboretum, and duplicates in the herbarium of Lingnan University.

***Indosasa angustata* sp. nov.**

Species omnium generis mihi cognitarum proxima *I. gibbosae* (McClure) McClure,³ sed culmorum vaginis versus apicem angustissimum attenuato-angustatis, marginibus sursum rectis vel concavis (haud convexis), dorso inter nervos aciculis a latere patentibus subpersistentibus obsitis, culmorum ramorumque nodis minus inflatis procul recedens.

Culmi fere 8 m. alti et 4.2 cm. diametro (teste Tsang), erecti, omnino glabri; *internodia* anguste fistulosa, levis vix nervosa, primo tenuiter cerata deinde porriginosa, postremo munda; *nodi* cicatrice prominuli, supra cicatricem in supercilium latum modice inflati. *Culmorum vaginae* valde elevato-nervosae, crassiusculae chartaceaeque mox dissolutae, sursum longe attenuato-angustatae, marginibus sursum rectae vel concaviusculae (haud convexae), apice angustissimae, dorso inter nervos aciculis a latere patulis, hyalinis, brunneatis, subpersistentibus, obsitae, marginibus ciliis brunneatis fimbriatae; *auriculae* fere haud evolutae; *setae orales* utrinque vulgo 2-4, 3-4 mm. longae, rigidae, scabrae vel hispidae, basi crassae, sursum attenuatae; *ligula* usque ad 5 mm. alta (vagina quinta) et ultra, dorso dense hispida, apice convexa, margine integro ciliata; *lamina* erecta, rigidula, subpersistens, anguste triangula, in apicem angustum subulate acutum attenuata, marginibus involuta, utrinque glabra vel supra, basin versus, hispidula. *Rami* vulgo 2, interdum 3 vel 1, semipatentes, valde inaequales vel subaequales, tenues, rigidi, usque ad 35 cm. longi (in specimine), omnino glabri; *ramuli* solitarii vel raro gemini, vaginellis basalibus gemmiparis, aphyllis, persistentibus, elevato-nervosis, plerisque primo plus minusve dense hispidulis vel substrigosis, sensim glabrescentibus. *Foliorum vaginae*

¹Contribution from the Botanical Survey, Lingnan University.

²Professor and Curator of Economic Botany, Lingnan University, Canton, China. On leave, 1941-.

³*Indosasa gibbosa* (McClure) comb. nov.

Sinobambusa gibbosa McClure, Lingnan Univ. Sci. Bull. 9: 58. 1940.

4–10, infimis laxe, superioribus arcte amplexantibus, elevato-nervosae, dorso primo setis patulis deciduis et basi bulbosis, sparse obsitae, demum papillosae; *auriculae* nullae vel debiles, glabrae; *setae orales* nullae vel paucae, tenues subtiliter scabrae; *ligula* circa 1 mm. longa, basi crassa, dorso hispidula, apice convexiuscula, margine integro glabra; *petiolus* 5–10 mm. longus, utrinsecus glaber; *foliorum laminae* usque ad 21.5 cm. longae et usque ad 3.4 cm. latae, lanceolatae vel oblongo-lanceolatae vel sublineari-lanceolatae, pleraeque apice basique attenuatae, interdum intima basi rotundata, apice scabro-subulatae, supra glabrae, subtus dense hispidulae, utrinque subconcoloratae, marginibus cartilaginae; *venulae transversae* utrinque conspicuae. *Inflorescentiae* desideratae.

TYPE: *W. T. Tsang 30050*, collected June 18, 1940, near Lung Waan. "Wild; occasional on dry clay soil in forest; culms 20 Chi. ft. (7.5 m.) tall." Chinese name (Cantonese): *Foo Chuk*, i.e., Bitter Bamboo.

It is with some hesitation that I place this species here. It is not closely allied to any of the known species of *Indosasa*, and it shows some affinity toward some of Gamble's narrow-sheathed species of *Arundinaria*, but the latter are not all true *Arundinarias*, and their generic affiliation remains to be determined.

***Indosasa solearis* sp. nov.**

Species proxima *I. crassiflorae* McClure, sed pseudospiculis multo angustioribus, lemmatibus textura tenuioribus et nervis prominentioribus, palea apice revecta ita soleaeforme sat distincta.

Culmi 2–3 m. alti (teste Petelot), glabri (pars superior tantum 73 cm. longa adest); *internodia* fistulosa (in specimine retorrida et profunde striata); *nodi* cicatrice et supra cicatricem in supercilium angustum sulcatum valde prominentes. *Culmorum vaginae* desideratae. *Rami* (floriferi tantum adsunt) solitarii vel basi semel iterumve divisi, semipatentes, glabri; *nodi* basi vaginellis deciduis instructi. *Foliorum vaginae* laminaeque desideratae. *Inflorescentiae* pseudospiculae ad nodos ramorum aphyllorum quasi spicate dispositae. *Pseudospiculae* usque ad 8 cm. longae, subfusiformes, deorsum longe angustatae, apice hebetate acutae, primo solitariae, nonnullis demum basi divisis ita binis vel etiam ternis venientibus. *Rhachis* pseudospicularum 10–15 mm. longa, glabra, internodiis 1–2 mm. longis, nodis haud inflatis, omnibus gemmiferis. *Prophyllum* membranaceum, circa 5 mm. longum, carinis longe ciliatum, alioquin glabrum. *Bracteae gemmiparae* circa 9, persistentes, tenuiter chartaceae, nervosae, glabrae, I: 3–4 mm. longa, ovata, obtusa, subapiculata, dorso carinata, sequentibus gradatim nervosioribus longioribusque (quarum V^a vel VI^a longissima est) usque ad 14–16 mm. longis, apice sublaminiiferis (infra apicem constrictis), superioribus circa 3 gradatim brevioribus, suprema 9–12 mm. longa, apice apiculata. *Spiculae* 5–13-florae. *Flosculae* omnes perfectae, infimis 1–2 interdum supremis 1–3 semper tabescentibus. *Gluma vacua* 1–0, formae lemmateos sed brevior. *Rhachillae segmenta* crassa, intus medullosa, in sicco cava, curvata, latere concavo sulculo mediano notata, omnino nitida, latere convexo versus apicem ciliolatum scabra, alioquin glabra. *Lemma* amplum, subventricosum, circa 12 mm. longum, obtusum vel subacutum, apiculatum, extus glabrum et nervis valde prominentibus nervosissimum, nervis sursum obscure tessellatis, intus apicem versus scabrum et nervis conspicue tessellatis notatum, marginibus glabrum. *Palea* lemmate multo brevior angustiorque, tenuiter char-

tacea, debiliter carinata, *apice obtuso subcomoso resecta ita soleaeformis*, secus carinas prope tantum apicem sparse ciliolata, extus alioquin glabra vel secus margines interdum scabriuscula. *Lodiculae* amplae, nervosissimae, subaequales, lanceolatae vel oblongo-lanceolatae, apice subite acuminata vel subacuta, utrinque glabrae, marginibus ciliatae, duobus anterioribus dimidio infimo uno latere valde incrassatis brunneatisque, alioquin omnino hyalinae. *Antherae* circa 5 mm. longae, lineares, apice emarginatae. *Ovarium* angustum, glabrum, apice attenuatum. *Stylus* brevis, glaber. *Stigmata* 3 approximata, subnuda, interdum quasi ala hyalina instructa. *Fructus* maturus non inventus.

TYPE in U. S. National Herbarium, no. 1610012, collected in December 1930, by Petelot (no. 4287), "bamboo 2-3 m. high forming thickets (*broussaies*) at an altitude of about 1000 m. on the Vam Dao massif, Tonkin."

The specific name (Latin, sandal-shaped) alludes to the peculiar shape of the palea, which results from the folding forward of the apex to form a shallow pocket like the toe of a lounging slipper. This feature distinguishes the species at once from all the others known to me.

Bambusa aurinuda McClure, Lingnan Univ. Sci. Bull. no. 9: 3. 1940.

When this species was set up, *W. T. Tsang* 29447, consisting of sterile material but including good culm sheaths, by which the plant may be identified without difficulty in the field, was chosen as the type. *W. T. Tsang* 28988, with leaves and flowers but no culm sheaths, was taken, on the basis of a careful comparison of the few vegetative characters available, to be the same. On the strength of this conclusion, *W. T. Tsang* 28988 was used as the basis of a description of the flowers, and was designated as a hypotype of the species. The present collection under *W. T. Tsang* 30198, however, contains both flowers and good culm sheaths, presumably from the same plant, and the flowers prove to be different from those of *W. T. Tsang* 28988 originally taken to be the same species and designated as a hypotype. In the light of this new material, it seems best to exclude *W. T. Tsang* 28988 from the concept of the species, and to prepare a new description on the basis of the more complete material, including flowers reasonably presumed to be associated with the sheaths, which are like those in the type. It will be seen that the vegetative structures, including the culm sheaths, in the new material agree in all particulars with the type, and with the original description of the type.

Culmi erecti vel suberecti, usque et ultra 11 m. alti (teste Tsang), omnino glabri; *internodia* teretia, fistulosa, inania; *nodi* cicatrice crasso elevati, supra cicatricem vix vel paullo inflati. *Culmorum vaginae* deciduae, in sicco papyraceo-coriaceae vel coriaceae, omnino, praecipue margines versus, valde elevato-nervosae, dorso marginibusque glabrae; *auriculae* validae, inaequales, obovatae vel oblongae, in vaginis superioribus plerisque plus minusve excurrentibus reflexisque, utrinque obscure scabrae; *setae orales* in vaginis inferioribus saepissime nullae vel auricularum margine exteriori 1-2, in superioribus 1-plurimae, 5-10 mm. longae, sinuosae, pallido- vel fusco-stramineae, rigidae, basi glabrae vel obscure scabrae, in sicco fragilissimae fugacesque; *ligula* in medio 1-2 mm. alta, utrinque vix coarctata, apice convexa vel arcuata, margine integro dense pallido-striata; *lamina*

erecta utrinsecus nervosa, in vaginis inferioribus subtriangulis, in superioribus ovato-lanceolata, apice subito acuminata subulataque, basi subcordata, extus glabra, intus inter nervos aciculis fuscis antrorse scabra vel substrigosa, marginibus modice involutis, basin versus ciliatis. *Rami* inermes patentes; *ramuli* usque ad 11-foliati, alioquin ut in *B. tuldoidea* Munro. *Foliorum vaginae* dorso marginibusque glabrae; *auriculae* valde evolutae, olivaceae, falcatae, glabrae vel scabriusculae; *setae orales* pleraeque valide evolutae, tenuissimae, fragiles, pallidae, sinuosae, glabrae vel basi obscure hispidulae; *ligula* brevissima vix exserta; *petiolus* brevis crassus utrinque glaber vel supra hispidulus; *laminae* usque ad 20 cm. longae et usque ad 22 mm. latae, oblongo- vel lineari-lanceolatae, apice acutae vel longo-acuminatae, glabro-subulatae, infimis basi subcordatis, supremis basi attenuatis, supra glabrae vel secus marginem exteriorem scabrae, subtus sparse (interdum obscure) pilosulae, demum glabrescentes; *venulae transversae* non manifestae, "glandulis pellucidis" minutis tamen compluribus. *Inflorescentiae* pseudospiculae ad nodos ramorum ramulorumque nudorum in glomerulis dissitis congestae. *Pseudospiculae* usque 4.5–5 cm. longae lineares, vel teretes vel subteretes. *Rhachis* brevissima, glabra. *Bractae gemmiparae* vulgo 2, brevissimae, ovatae, obtusae, chartaceae, fragiles. *Spiculae* subcylindricae vel paullo compressae, 5–12-florae, mox discedentes. *Flosculae* omnes perfectae, superiores 2–3 semper, infima interdum, tabescentes. *Gluma vacua* vulgo 1, formae lemmateos sed brevior, vulgo 5–6 mm., raro 8.5 mm. longa, glabra. *Rhachillae segmenta* claviformia, glabra, pleraque $\frac{1}{4}$ – $\frac{1}{3}$ paleae aequantia. *Lemma* usque ad 10 mm. longum, naviculiforme, acutum, apiculatum, glabrum, chartaceum, plurinerve, secus nervos dilute violascente. *Palea* lemma aequans vel brevior, apice acuto comosula, carinis sursum tantum sparse subtiliterque ciliolata, alioquin glabra vel apicem versus inter carinas subtiliter hispidula. *Lodiculae* hyalinae, subaequales, ovato-lanceolatae, obtusae, marginibus ciliatae. *Antherae* 4–4.5 mm. longae, luteae. *Ovarium* generis, apice hispidulum. *Stylus* brevis, crassiusculus, hispidulus. *Stigmata* 3, plumosa. *Fructus* maturus non inventus.

This redescription of the species is based on *W. T. Tsang* 30198, collected July 22, 1940, near Lung Waan. "Semi-cult. for edible shoots; occasional near villages on dry clay soil; culms 30 Chi. ft. (11.24 m.) tall." Chinese name (Cantonese): *Taai Wong Chuk*, i.e., Large Yellow Bamboo.

On the basis of the culm sheaths in the type, this species was placed near *B. tuldoidea* Munro. The flowering material now available confirms this relationship, as does the larger stature indicated for the plant. The spikelets in our species, however, are more slender and the florets in each spikelet are significantly more numerous and smaller. Our species is most readily distinguished from *B. tuldoidea* on the basis of the auricles and other features of the culm sheath.

The case of the confusion of two species illustrated above serves to emphasize the importance of collectors' securing culm sheaths definitely and unmistakably associated on the same plant with flowers whenever possible, for the simple reason that without such association made in the field, taxonomic work based on flowering material alone can be of little use for field determinations, since the plants to be identified in the field usually do not afford flowers, but do present culm sheaths for at least a

part of each year. The culm sheaths are usually quite as distinctive as the flowers, and often much more strikingly so. This fact was recognized by Munro and other earlier botanists, to whom, however, very little material containing culm sheaths was available, and by Gamble, whose work on the bamboos of India is eminently useful for field determinations, chiefly because he paid special attention to the culm sheaths.

It is now necessary that the material under *W. T. Tsang* 28988, originally misidentified as *B. aurinuda* McClure, be given a new status.

***Bambusa Tsangii* sp. nov.**

Species primo cum *B. aurinuda* McClure, a me confusa, tamen inflorescentiae *B. aurinudae* verae nunc inventae, praeterea aperte distinctae esse probatae sunt. *Bambusa Tsangii* a *B. aurinuda* saltem pseudospiculis comparative lentius divisis, pseudospiculis flosculisque multo amplioribus, lemmatibus dimidio longioribus differe videtur.

Culmi erecti vel suberecti, circa 3 m. alti (teste *Tsang*); *internodia* teretia vel subteretia, glabra, anguste fistulosa; *nodi* glabri, cicatrice et supra cicatricem prominuli. *Culmorum vaginae* deciduae desideratae. *Rami* plures, inermes, glabrae, tenues (superiores tantum adsunt), inaequales, uno mediano ceteris multo longiore crassioreque. *Foliorum vaginae* glabrae; *auriculae* pleraeque validae, falcatae, glabrae, margine nudae vel processis tenuissimis glabris radiatis sparse instructae; *ligula* perbrevis, basi crassa, dorso hispidula, apice recta vel convexiuscula, margine integro plerumque glabra; *petiolus* perbrevis, utrinsecus glaber, supra saepe rugulosus; *laminae* usque ad 10.5 cm. longae et usque 1.4 cm. latae, lanceolatae vel oblongo-lanceolatae, apice acutae vel acuminatae et quasi aristatae, infimis basi cordato-superioribus cuneato-rotundatis, utrinsecus glabrae vel subtus interdum pilis mollibus sparse obsitae, marginibus cartilagineis inaequaliter spinulosae; *venulae transversae* non manifestae. *Inflorescentiae* pseudospiculae ad nodos ramorum ramulorumque vel nudorum vel basi foliiferorum, primo solitariae demum plus minusve aggregatae, ramis ramulisque sterilibus foliiferis interdum cum floriferis intermixtis. *Pseudospiculae* usque ad 5 cm. longae, fusiformes curvatae, mox dissolutae. *Rhachis* brevissima, glabra, tarde ramosa. *Bracteae gemmiparae* vulgo 2, valde inaequales, superiore vulgo 5 mm. raro usque ad 9 mm. longa, glabrae, nervosae, apiculatae. *Spiculae* subteretes, paullo compressae, 7-8-florae. *Flosculae* omnes perfectae, superiores 1-2 semper, infima interdum, tabescentes. *Glumae vacuae* vulgo nullae. *Rhachillae segmenta* $\frac{1}{4}$ - $\frac{1}{3}$, rarissime paene $\frac{1}{2}$ paleae aequantia, claviforme vel cuneata, fistulosa, uno latere plana, prope apicem ciliolatum scabriuscula, alioquin glabra, infra lemmata tantum disarticulata. *Lemma* usque ad 15 mm. longum, tenuiter papyraceum, nervosum, glabrum, olivaceum, apice saepissime purpura dilute tincto, acutum, apiculatum. *Palea* lemmate brevior vel raro subaequalis, apice hebet acuta comosulaque, inter carinas 7-nervis, glabra, carinis ciliata, extra carinas obscure scabriuscula. *Lodiculae* subaequales hyalinae, utrinque glabrae vel interdum dorso molliter hirtellae, marginibus ciliatae. *Antherae* maturae omnes descitae, reliquis junioribus tantum apice obtusis emarginatis vel quasi bicornibus. *Ovarium* generis, apice hispidum. *Stylum* 1-2 mm. longum hispidum. *Stigmata* 3, plumosa. *Fructus* maturus non inventus.

TYPE: *W. T. Tsang* 28988, collected May 7, 1939, near Chan Uk Village, Ha Coi, at the foot of Taai Wong Mo Shan, Tonkin. "Wild; fairly common among scattered

shrubs on sandy soil; 3 m. tall; flowers (anthers!) light yellow." Chinese name (Cantonese): *Wong Chuk*, i.e., Yellow Bamboo.

This species was at first confused with *B. aurinuda*, and was made the basis of a description of the flowers of that species, and for that reason was designated as a hypotype of that species. However, now that the flowers of *B. aurinuda* have been found associated with culm sheaths of that species, they prove to be unmistakably distinct. *Bambusa Tsangii* differs from *B. aurinuda*, so far as the material available is concerned, in the longer and more slowly branching pseudospikelets, the larger and fewer-flowered spikelets, and the lemmas longer by a half.

Bambusa Tsangii is apparently closely allied to *B. tulldoides* Munro, from which, on the basis of the material available, it is weakly distinguished by its smaller stature, the less strongly congested inflorescences, the lemmas more prominently apiculate, the palea with keels much more prominently ciliate, and the subglabrous leaves. It is probable that the culm sheaths, when they are known, will reveal more conspicuous differences. The large, almost solitary pseudospikelets in *B. Tsangii* are reminiscent of those of *B. multiplex* (Lour.) Raeusch., but the much smaller individual florets, the prominently ciliate keels of the palea, and subglabrous leaves which are concolorous on the two surfaces readily distinguish it from Loureiro's species.

The species is named for W. T. Tsang (Tsang Wai-tak) whose energetic and discerning field work has brought to light many plants new to science.

Lingnaniania atra sp. nov.

Species characteribus nonnullis *L. Chungii* (McClure) McClure affinis sed saltem internodiis culmorum ligni crassi pulchre striatis, conformatione vestituque vaginorum culmorum, vaginis foliorum auriculas et setas orales carentibus, laminis foliorum subtus glabris aperte distincta.

Culmi erecti usque et ultra 11 m. alti (teste Tsang); *internodia* modice elongata, fistulosa, inania, cylindrica, praecipue infra nodos glauca, infimis supra nodos pilis sericeis adpressis crasse tectis, alioquin ab initio omnino glabra; *nodi* cicatrice glabro valde prominentes, supra cicatricem paullo inflati. *Culmorum vaginae* deciduae, ut in generis typo crassae induratae et faciliter fissiles, apice vel convexae vel arcuatae vel subrectae laxaeque, dorso glaucae, *basi retrorse atro-hirsutae, alioquin aciculis atris* (vel in superioribus pallidioribus) antrorse adpressis et basi bulbosis plus minusve dense obsitis; *auriculae* (in culmis saltem magnitudinis maturitatis) nullae vel fere ad lineam longissimam redactae, margine ciliolae deciduae instructae; *setae orales* sparsae, erectae, tenues, basi bulbosae hispidaeque, caducae mox fugaces; *ligula* vix 1 mm. alta, haud exserta, latitudine apicem latissimum vaginae aequans, margine processibus fragilissimis usque ad 15 mm. longis basi hispidulis sursum glabris tenuissimisque fimbriata; *lamina* erecta plus minusve persistens demum abscidens, firma, vel plana vel marginibus plus minusve involuta, lanceolata, apice attenuato-acuminata, basi constricta, utrinque nervosa, dorso glabra, ventre scabra. *Rami* numerosissimi, congesti, tenuissimi, longitudine valde inaequales, ima basi et sursum divisi, internodiis elongatis, glabris, nodis paullo inflatis, vaginellis nervosis, deorsum aciculis patentibus, deciduis, basi bulbosis, sparse

obsitis, demum papillosis deciduisque. *Foliorum vaginae* tenues, tenuiter nervosae, glabrae vel infimis interdum ut in vaginellis ramorum pubescentiae, dorso carinatae; *auriculae* setae oralesque nullae vel debilissimae; *ligula* brevissima haud exserta; *petiolus* utrinque glaber; *laminae* usque ad 38 cm. longae et usque ad 2.4 cm. latae, oblongo- vel lineari-lanceolatae, apice attenuato-acuminatae, aristatae, basi cuneato-rotundatae, utrinque glabrae vel interdum subtus deorsum prope costam pilis sparse instructae; *venulae transversae* subtus interdum obscure manifestae. *Inflorescentiae* desideratae.

TYPE: *W. T. Tsang* 30546, collected Sept. 29, 1940, near Kau Kaai Ts'uen, at the foot of Kau Nga Shan. "Wild; occasional on wet soil in forest near stream; culms 30 Chi. ft. (11.24 m.) tall, used by the natives to make paper." Chinese name (Cantonese): *Shan Taan Chuk*, i.e., Mountain Single (-node) Bamboo. A sample of the paper made from this bamboo was secured by the collector and a part of it will be distributed with each duplicate.

The specific name alludes to the very black hairs clothing the lower culm sheaths.

***Lingnania sesquiflora* sp. nov.**

Species habitu scandente, spiculis pallidis parviflorisque affinis *L. scandenti* McClure, sed spiculis semper sesquifloribus, palea carinis breviter ciliatis, foliorum vaginis cum auriculis et setis oralibus saepissime valde evolutis, ligula margine longe fimbriata, laminis omnibus proportionem latioribus et basi rotundatis aperte distincta.

Culmi scandentes usque ad 6 m. alti (teste Tsang); *internodia* (superiora tantum adsunt) fistulosa, inania, cylindrica, glabra, pallida; *nodi* cicatrice collari prominente glabro 2–3 mm. lato instructi, supra cicatricem paullo inflati et interdum pro parte pilis sericeis adpressis tecti. *Culmorum vaginae* deciduae (desideratae). *Rami* plures, fasciculati, glabri, tenues, praecipue ima basi divisi, interdum supra semel vel raro iterum divisi, inaequales, uno mediano ceteris multo longiore crassioreque, floriferis et foliiferis vel distinctis et remotis vel intermixtis vel ramis simul flores simul folios gerentibus. *Foliorum vaginae* glabrae, interdum primo tenuiter ciliatae, postea porriginosa, nunc congestae nunc longe exsertae; *auriculae* nullae vel valde evolutae semirotundatae, fuscae, glabrae vel obscure scabrae, saepe reflexae; *setae orales* nullae vel (auriculis praesentibus) valde evolutae, basi bulbosae, in margine tantum auricularum arctae, usque ad 10 mm. longae, fuscae et obscure scabrae, supra tenuissimae, radiatae; *ligula* circa 1.5 mm. longa, dorso glabra, apice vulgo convexa, margine ciliis deciduis vel fugacibus utrinque 2–3 mm. longis, medio brevioribus fimbriata; *petiolus* crassus, basi bulboso quasi pulvinatus, et saepissime rugosus, utrinque glaber vel supra interdum hispidulus; *laminae* usque ad 25 cm. longae et 5.4 cm. latae, oblongo-ob lanceolatae vel paene oblanceolatae vel (basalibus brevibus) lanceolatae, apice attenuato acuminatae subulataeque, basi rotundatae, subtus secus unum latus tantum costae sparse pilosae, alioquin utrinsecus glabrae; *venulae transversae* non manifestae vel interdum obscurissimae inventae. *Inflorescentiae* pseudospiculae ad nodos ramorum ramulorumque glomerulis dissitis congestae. *Pseudospiculae* vulgo usque ad 13 mm., interdum paene 18 mm. longae, primo subfusiformes. *Bractae gemmiparae* 2–3, ovatae obtusae apiculatae glabrae, infima circa 2 mm. longa, superioribus gradatim longioribus. *Spiculae* sesquiflorae, plus

minusve compressae, tenuiter chartaceae, pallide vel fusce stramineae, fere omnino glabrae, mox discedentes. *Glumae vacuae* 3-4, ovatae, obtusae, apiculatae, ventricosae, extus glabrae nitidaeque, infima 3-4 mm. longa, superioribus gradatim longioribus usque ad 7.5 mm. longis. *Lemma* fertile 9-10 mm. longum, ovatum, ventricosum, acutum, apiculatum, obscure plurinerve. *Palea* lemma aequans vel paullo longior, apice obtusa, dorso profunde sulcata, carinis subtiliter ciliata, prope margines apicemque asperella, rudimento apice acuminatissimo vulgo paleam paullo superante. *Rhachillae segmenta* omnia (supremo attenuato excepto) brevissima glabra, infra et inter glumas et infra lemma fertile tantum disarticulantia. *Lodiculae* crassae, dorso hispidulae, margine rigide ciliatae, obovatae, apice obtusae vel interdum subacutae, deorsum angustatae, subsimiles vel interdum posteriore multo angustiore et apice acuta. *Antherae* circa 5 mm. longae, lineares, muticae. *Ovarium* subtriquetrum elongato-obovatum, deorsum glabrum, apice tantum pericarpio crasso, duro, hispido, tectum. *Stigmata* 3, pilosa. *Fructus* maturus caryopsis glabra, 8 mm. longa, anguste ovoidea, basi rugosa quasi retorrída, dorso sulco profundo notata, sursum basi hispida styli coronata; *pericarpium* deorsum tenue, apice crassum durum.

TYPE: *W. T. Tsang* 30102, collected June 30, 1940, at Lung Waan. "Wild; occasional on dry clay soil, by roadside in forest; culms scandent, 16 Chi. ft. (6 m.) long." Chinese name (Cantonese): *T'ang Chuk*, i.e., Climbing Bamboo.

***Dinochloa alata* sp. nov.**

Species auriculis culmorum vaginarum subnullis *D. orenudae* McClure affinis, sed culmorum vaginis latere exteriori tenuiter chartaceis, laxis hiantisque, deorsum in alam amplam rotundatam excurrentibus, ligula margine longissime fimbriata aperte distincta.

Culmi scandentes usque et ultra 11 m. alti (teste Tsang); *internodia* fere solida, cylindrica, elongata, glabra, prope nodos inflata, infra nodos glauca, superioribus asperellis; *nodi* glabri, cicatrice collari gibboso prominente rugoso, glabro, 3-5 mm. lato instructi. *Culmorum vaginae* deciduae, latere exteriori nervosae, tenuiter chartaceae, laxae hiantaeque, et deorsum in alam amplam rotundatam excurrentes, alioquin arctae crassae induratae et nervos prominentes carentes, deorsum pilis mollibus adpressis pallide brunneatis leviter obsitae sensim glabrescentes, alioquin ab initio glabrae, supra versus apicem latum vel subtruncatum vel concavum leniter attenuatae; *auriculae* subnullae vel ad labiam angustissimam glabram redactae; *setae orales* nullae; *ligula* valida, dorso scabra, apice variabilis, margine processibus crassis rigidis glabris, in vagina quinta 15 mm., in superioribus usque ad 22 mm. longis, fimbriata; *lamina* persistens, valde reflexa, plana, subtenuis, anguste lanceolata, in vagina quinta quam vaginae ipsius dimidiam longior, utrinsecus nervosa glabraque, margine subtiliter spinulosa. *Rami* ut in genere, internodiis glabris, nodis inflatis; vaginellis vel hispidulis vel glabris, demum deciduis. *Foliorum vaginae* glabrae; *auriculae* in vaginis superioribus nullae vel debilissimae, inferioribus plerisque valde evolutae, crassae reflexae, utrinque glabrae; *setae orales* radiatae usque ad 10 mm. longae tenues scabrae persistentes; *ligula* perbrevis, dorso scabriuscula, apice subrecta, margine inaequaliter denticulata; *petiolus* 1-2 mm. longus, utrinque glaber vel subglaber; *laminac* usque ad 20 cm. longae et usque ad 2.8 cm. latae, vel ovato- vel oblongo- vel lineari-lanceolatae, basi rotundatae, utrinque glabrae vel raro deorsum subtus secus tantum costam

pilis debilibus sparse obsitae; *venulae transversae* vulgo haud manifestae, raro obscurae, remotae, debiles. *Inflorescentiae* desideratae.

TYPE: *W. T. Tsang* 30410, collected Aug. 25, 1940, near Laan Aang Ts'uen. "Wild; occasional on dry clay soil at edge of a forested ravine; culms 30 Chi. ft. (11.24 m.) tall." Chinese name (Cantonese): *T'ang Chuk*, i.e., Climbing Bamboo.

Lingnania remotiflora (O. Ktze.) comb. nov.

Arundarbor remotiflora O. Ktze. Rev. Gen. Pl. 760. 1891.

Bambusa remotiflora O. Ktze. l.c. *in syn.*

Lingnania parviflora McClure, Lingnan Univ. Sci. Bull. **9**: 37. 1940.

ANNAM: Turong [Tourane], *Otto Kuntze s.n.*, Feb. 1875. Cultivated; 30–50 ft.

Through the courtesy of the Curator of the Herbarium of the New York Botanical Garden, where Kuntze's herbarium is now deposited, I was able to examine the type (in two sheets) of Kuntze's species. Although the specimens are fragmentary, there is sufficient material to justify the assertion that the inflorescences show no character by which Kuntze's species can be distinguished from *Lingnania parviflora* McClure, the type of which was collected on the island of Hainan. Dr. A. Camus, who examined Kuntze's type at the request of Dr. E. D. Merrill, reduced this species to *Bambusa tuldoidea* Munro; see Merrill, *Brittonia* **2**: 191. 1936.

In addition to the species here described as new, Tsang's 1940 collection includes three species described earlier from southern China and here reported for the first time from Indo-China:

Bambusa gibba McClure, Lingnan Univ. Sci. Bull. no. **9**: 10. 1940.

Lung Waan; "wild; occasional on moist sandy soil near stream in forest. Culms 14 Chi. ft. (5.25 m.) tall." Chinese name (Cantonese): *Shui Wong Chuk*, i.e., Water Yellow Bamboo, *W. T. Tsang* 30164, collected July 19, 1940.

Lingnania cerosissima (McClure) McClure, Lingnan Univ. Sci. Bull. no. **9**: 35. 1940.

Bambusa cerosissima McClure, Lingnan Sci. Jour. **15**(4): 637. 1936.

Lung Waan; "Cult.; occasional near villages in dry clay soil; culms 30 Chi. ft. (11.24 m.) tall." Chinese name (Cantonese): *Taan Chuk*, i.e., Single (-node) Bamboo. *W. T. Tsang* 30153, collected July 5, 1940.

Schizostachyum pseudolima McClure, Lingnan Sci. Jour. **19**(4): 537, pl. 39, 40. 1940.

Lung Waan; Laan Aang Ts'uen; Kau Kaai Ts'uen at foot of Kau Nga Shan; "Wild; occasional in dry clay or moist sandy soil; in forests; culms 10–16 Chi. ft. (3.75–6 m.) tall. Chinese names (Cantonese): *Pok Chuk*; *Pok Chuk Tsai*, i.e., Thin (-walled) Bamboo. *W. T. Tsang* 30119, collected July 2, 1940; *W. T. Tsang* 30322, collected Aug. 10, 1940; *W. T. Tsang* 30536, collected Sept. 28, 1940.

There may also be reported the following, from the Lingnan University Herbarium:

Schizostachyum hainanense Merr. ex McClure, Lingnan Sci. Jour. **14**(4): 591. pl. 36 & 39, fig. 1. 1935.

Tonkin, without precise locality or other field notes. LU 19889 (*H. Fung*) collected Jan. 21, 1932.

Facilities and assistance made available by Mr. B. Y. Morrison, Principal Horticulturist in Charge, Division of Plant Exploration and Introduction, Bureau of Plant Industry, and by Dr. W. R. Maxon, the Curator, and Mrs. Agnes Chase, Custodian of Grasses, of the U. S. National Herbarium, have

been of the greatest value in the working up of this collection. Important specimens gathered by Joseph and Mary Strong Clemens in the vicinity of Hue, Annam, were lent by Dr. H. L. Mason, Curator of the Herbarium, University of California, for study and comparison. The continuation of our work on bamboo has been greatly facilitated by occasional grants-in-aid received from the National Research Council, the Rockefeller Foundation, and the China Foundation for the Promotion of Education and Culture.

DIVISION OF PLANT EXPLORATION & INTRODUCTION,
BUREAU OF PLANT INDUSTRY, U. S. DEPT. AGRICULTURE,
WASHINGTON, D. C.

NOTES ON THE ROOTING OF SOME CONIFERS FROM CUTTINGS*

KENNETH V. THIMANN AND ALBERT L. DELISLE

With one text-figure and one plate

SOME two years ago, the authors reported (1939) experiments on the rooting of "difficult" plants, including hemlock, Norway spruce, and white pine. In the course of the subsequent work, which was mainly directed to more general problems, observations have been made on the rooting of a number of other coniferous trees. While these data do not disclose any new principles, they provide information as to the relative ease of rooting of several important species and will therefore be reported briefly.

ABIES. Experiments were made from time to time over a period of 13 months, from March to April of the succeeding year, on two species of *Abies*, to determine (a) the optimum time for rooting, (b) the optimum auxin treatment. Cuttings were taken from trees in the Arnold Arboretum, of various ages between 12 and 50 years, and the results are averaged in table 1. Since treatment with sucrose had previously been found to be beneficial, the bases of the cuttings were in most cases immersed in 2% sucrose for 48 hours following auxin treatment. Where comparisons were made, sucrose treatment had a definite but small beneficial effect. In order to simplify the presentation, all the data in tables 1 and 2 refer to sucrose treatment unless otherwise indicated. Sucrose did not induce rooting in the summer months, and, in general, its effect was mainly in tending to improve the maintenance of the cuttings where rooting was taking place. Vitamin B₁ was completely without effect on the rooting of either of these species.

The superiority of the winter months is very evident, especially January for *Abies koreana*, and March for *Abies concolor*.

The optimum auxin treatment is less clear, although the cuttings are clearly capable of responding to auxin. However, it appears that at the time of year when rooting is slight, 100 mg. per litre is about optimal, while when rooting is vigorous, 200 mg. per litre is preferable.

Comparison of trees of different ages appears to show, at any rate without auxin treatment, that the decreasing responsiveness of older trees persists over a wide age range. The data for winter cuttings of *A. concolor* (sugar-treated) are summarized in table 2. While, in white pine, the ability to root well fades out at 4 to 5 years, in *Abies*, it apparently persists up to 18 years of age.

*These experiments were carried out under the auspices of the Maria Moors Cabot Foundation for Botanical Research.

TABLE 1.
PERCENTAGE ROOTING OF TWO *Abies* SPECIES.
All cuttings treated with auxin (or water) for 24 hours,
then 2% sucrose for 48 hours, except where marked †

Month in which cuttings were taken	Abies koreana			Abies concolor		
	Auxin concentrations in mg./l.					
	0	100	200	0	100	200
March 1938	0†	16†	5†	—	—	—
July 1938	0	0	0	0	0	0
August 1938	0†	7†	0†	0†	0†	0†
December 1938	—	—	—	2	18	7
January 1939	25†	33†	70†	—	—	—
March 1939 (mean of 2 collections)	0	18	17	19	68	43
April 1939	0	10	0	0	0	0

TABLE 2.
EFFECT OF AGE ON ROOTING OF *Abies concolor*
Mean value of cuttings taken in December and March. All cuttings
treated with 2% sucrose for 48 hours following auxin treatment.

Age in years	Percentage of Rooting	
	Water controls	auxin 100 mg./l.
12	40	72
18	10	35
25	0	15
47	0	80

Results obtained with *Abies pectinata* (silver fir) are remarkable for the slowness of the response to auxin treatment. Cuttings obtained from an old tree at Sandwich, Mass.² in January, and kept in sand, showed no change for 5 months. Rooting then began, and after 7 months about 25% of those treated with auxin had rooted, while controls showed no roots. After 12 months those which had been treated with indole-acetic acid 100 mg. per liter gave 31% rooting; with 200 mg. per liter 45% rooted in the same time. The latter concentration gave slightly more extensive root systems, as shown by the representative cuttings in figure 1. Water controls showed only 6% rooting in the 12 months. Thus the effect of

²Obtained through the courtesy of Mr. Frank Sargent of The Massachusetts Department of Conservation, Bureau of Forestry.

a single 24-hour treatment only became observable many months afterwards, although it was ultimately of large magnitude. Cuttings whose base consisted of two-year-old wood, i.e. those cut at the base of the 1937 growth, rooted even better (4% in water, 27% in 100 mg. per liter and 80% in 200 mg. per liter after 12 months). Cuttings whose base consisted of three-year-old wood, however, rooted less than half as well as the standard one-year material. This species must thus be regarded, in the absence of more extended trials, as a relatively easily rooted plant.

As a whole it seems that the *Abies* species are capable of rooting in good percentage from old trees.

TSUGA. The good results previously reported on *Tsuga canadensis* L. taken in the fall from individual trees in the Arnold Arboretum, have since been found to be not obtainable with certain other trees. The response may, therefore, vary from clone to clone.³

A study of the effect of age of tree in *Tsuga diversifolia* gave the results summarized in table 3. Young trees⁴ gave excellent rooting on auxin treatment; old trees gave good values when taken in December, but not at other

TABLE 3.
Tsuga diversifolia. RESULTS AFTER 9-12 WEEKS IN SAND-PEAT MIXTURE.

Age of trees in years	Month in which cuttings were taken	Auxin concentration in mg./l.				
		0	25	100	200	400
3	December 1938	8	20	73	55	—
6	December 1938	4	25	50	63	—
42-60	December 1938	14	—	30	43	29
	March 1939	0	—	14	0	—
	August 1938	0	—	0	0	—

times. It will be noted that no effect of age is shown in the water controls with this species. This contrasts with the results previously found for *Pinus Strobus* and *Picea Abies*. On the whole *Tsuga diversifolia* cannot be regarded as among the most “difficult” of trees. A treatment with vitamin B₁ (0.5 mg. per liter), following auxin, had no effect on the number of cuttings rooted or on the size of the root systems and in two instances even slightly decreased the rooting. Representative cuttings are shown in figure 2. Actively growing terminal or subterminal branchlets were used.

³Zimmerman and Hitchcock (Contrib. Boyce Thompson Inst. 10: 474. 1939), in misquoting these results, lay emphasis on their finding for *Tsuga canadensis* that the age effect is “certainly not the principal limiting factor as claimed by Thimann and Delisle.” As a matter of fact, the data we reported were with cuttings from old trees, *Tsuga canadensis* being one of the few conifers in which we found no effect of the age of the plant.

⁴Obtained through the courtesy of Verkade’s Nurseries, Wayne, N. J.

PICEA. As with *Abies*, the rooting of blue spruce, *Picea pungens*, was followed at intervals throughout the year. A number of trees of medium age, 10–20 years, were used. Table 4 shows that no controls rooted at any

TABLE 4.
Picea pungens, AGED 10–20 YEARS. RESULTS AFTER 12 WEEKS IN SAND.

Month in which cuttings were taken	Auxin concentration in mg./l.		
	0	100	200
June 1938	0	0	0
August 1938 (two separate collections)	0	0	0
November 1938	0	43	27
February 1939 (two separate collections)	0	0	0
April 1939	0	80	57
June, July 1939	0	0	0

time, while a good response to auxin was obtained, limited to the winter and spring months. The optimum concentration is apparently 100 mg. per liter (when treatment is for 24 hours), the optimum time being in the spring. However, the absence of rooting on February cuttings suggests that data of a second season would be very desirable.

Picea Omorika, Serbian spruce, taken throughout the winter months, gave no rooting. Cuttings from four-year-old trees,⁵ however, gave moderate rooting. This plant presents one of the very few cases where we have obtained a real effect of treatment with vitamin B₁. As table 5 shows,

TABLE 5.
Picea Omorika. CUTTINGS TAKEN FROM TREES 4 YEARS OLD.
RESULTS AFTER 12 WEEKS IN SAND-PEAT MIXTURE.

Treatment	Auxin concentration mg./l.			
	0	25	100	200
Auxin (or water) 24 hours, then water 24 hours	4	18	26	36
Auxin (or water) 24 hours, then vitamin B ₁ , (0.5 mg./l.) 24 hours	17	30	49	66

cuttings treated with vitamin B₁ gave increased rooting at all auxin concentrations. The roots were also more numerous.

Some of the data of tables 1, 3 and 4 are summarized in the text-figure, which shows simply the highest percentage rooting obtained in each month,

⁵See above, (4)

irrespective of the auxin concentration used. In all cases, however, this was either 100 or 200 mg. per liter. The experiments are not numerous enough to define the optimum rooting times exactly, but the general trends are clear enough.

HIGHEST ROOTING EACH MONTH FOR 4 SPECIES OF CONIFERS —

AUXIN — 100 OR 200 MG. PER LITER

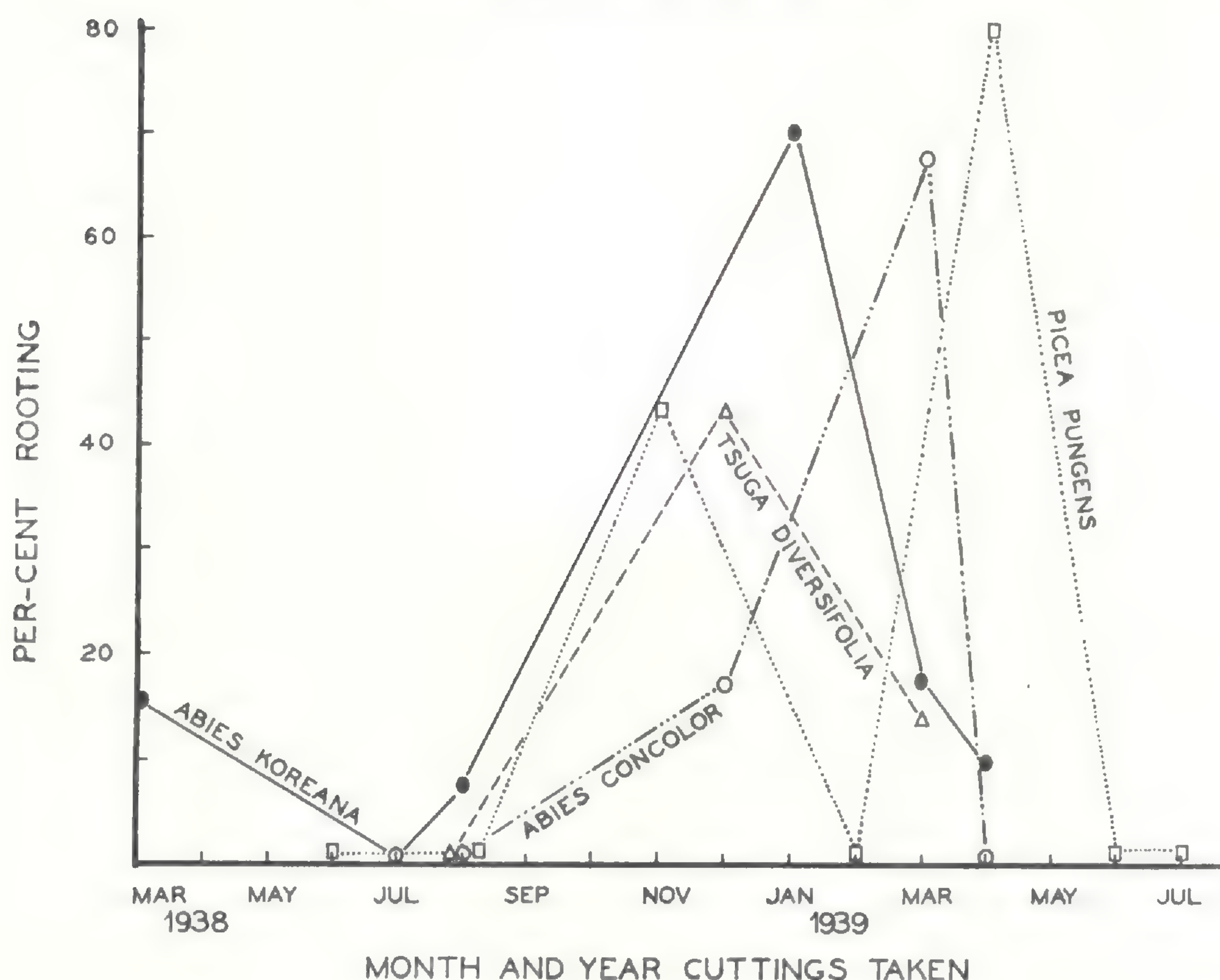


FIGURE 1

OTHER SPECIES. Table 6 gives data on three other trees considered as particularly interesting. It will be seen that *Podocarpus* roots readily, and *Sequoia* moderately so. Rooting of the latter from cuttings has, so far as the authors are aware, not been reported. Summer cuttings of *Sciadopitys* showed the unusual effect of a reduction in rooting by auxin treatment (cf. the results of Deuber and Farrar (1939, 1940) on *Picea Abies*). December cuttings behaved more normally. Vitamin B₁ was again without appreciable effect. Rooting of *Sciadopitys*, 4, 5, and 9 years old, has recently been reported by DeFrance (1938 a, b). Taking the data of tables 3–6 together, it is apparent that either 100 or 200 mg. per liter represents optimal auxin treatment for a number of trees.

An interesting observation was made on *Pinus Strobus* (white pine). Among a large number of cuttings, a few isolated brachyblasts or short

TABLE 6.
ROOTING OF OTHER CONIFERS.

Plant	Month	Age in years	Auxin concentration in mg./l.	Number of weeks required for rooting
			0 50 100 200	
Podocarpus neriifolia	March 1939	36	25 — 100 100	9-14
Sequoia sempervirens	March 1939	10	0 — 34 20	11
Sciadopitys verticillata	August 1938*	40	43 33 30 0	32
verticillata	December 1938	40	0 — 22 0	28
verticillata	December 1938 (treated with vitamin B ₁)	40	0 — 29 0	28

* Of the cuttings alive and unrooted 3 months later, one half of each group were given a biotin preparation; there was no effect.

shoots (needle bundles, or fascicles) became accidentally embedded in the peat-sand medium. Several of these rooted. The rooting of these individual brachyblasts was then studied further, and it was found that the brachyblasts from old trees show slight but definite rooting on auxin treatment, while those from young trees root very vigorously. Table 7 shows that up to 74% rooting (71 out of 97) eventually was obtained with 3-year-old trees. This is probably higher percentage rooting than would be given

TABLE 7.
PERCENTAGE ROOTING OF BRACHYBLASTS OF *Pinus Strobus*, TAKEN IN NOVEMBER, TREATED 24 HOURS, THEN KEPT IN PEAT-SAND MIXTURE.

Age of tree in years	Auxin concentration in mg. per liter			Time of first rooting	Time of complete rooting
	0	50	100		
3	7.5	31	74	3 months	9 months
80	0.0	3	0.5	3½ months	3½ months

by ordinary cuttings. It is also remarkable that the effect of age of the tree is so clearly shown in this material. As mentioned in a preliminary report (Delisle, 1940) the rooted brachyblasts, transferred to soil, do not usually survive more than a few months, unless an active bud is already present. This fact would seriously limit the immediate application of this material in practical propagation. However, the whole phenomenon is now being



FIGURE 1

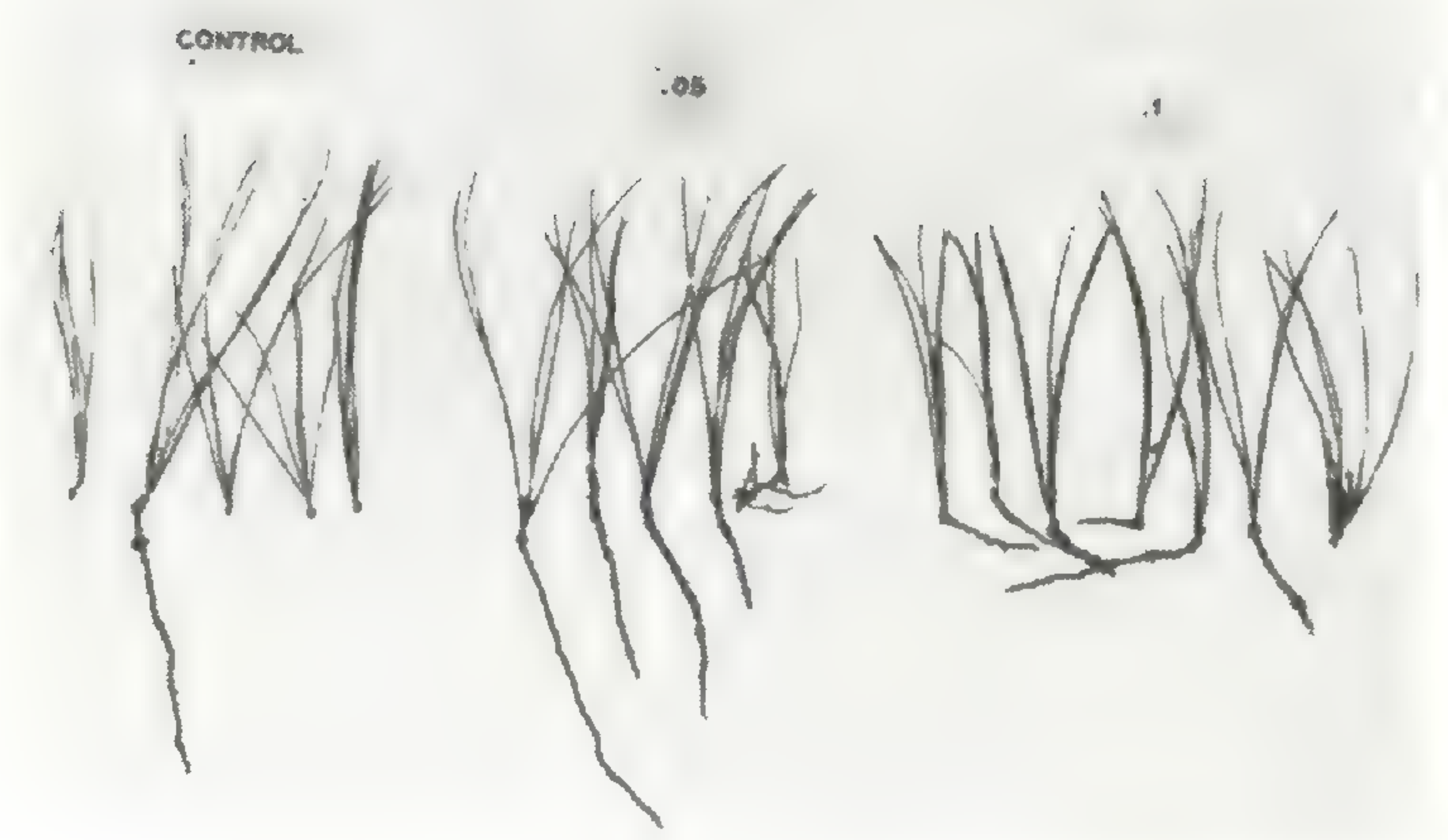


FIGURE 3

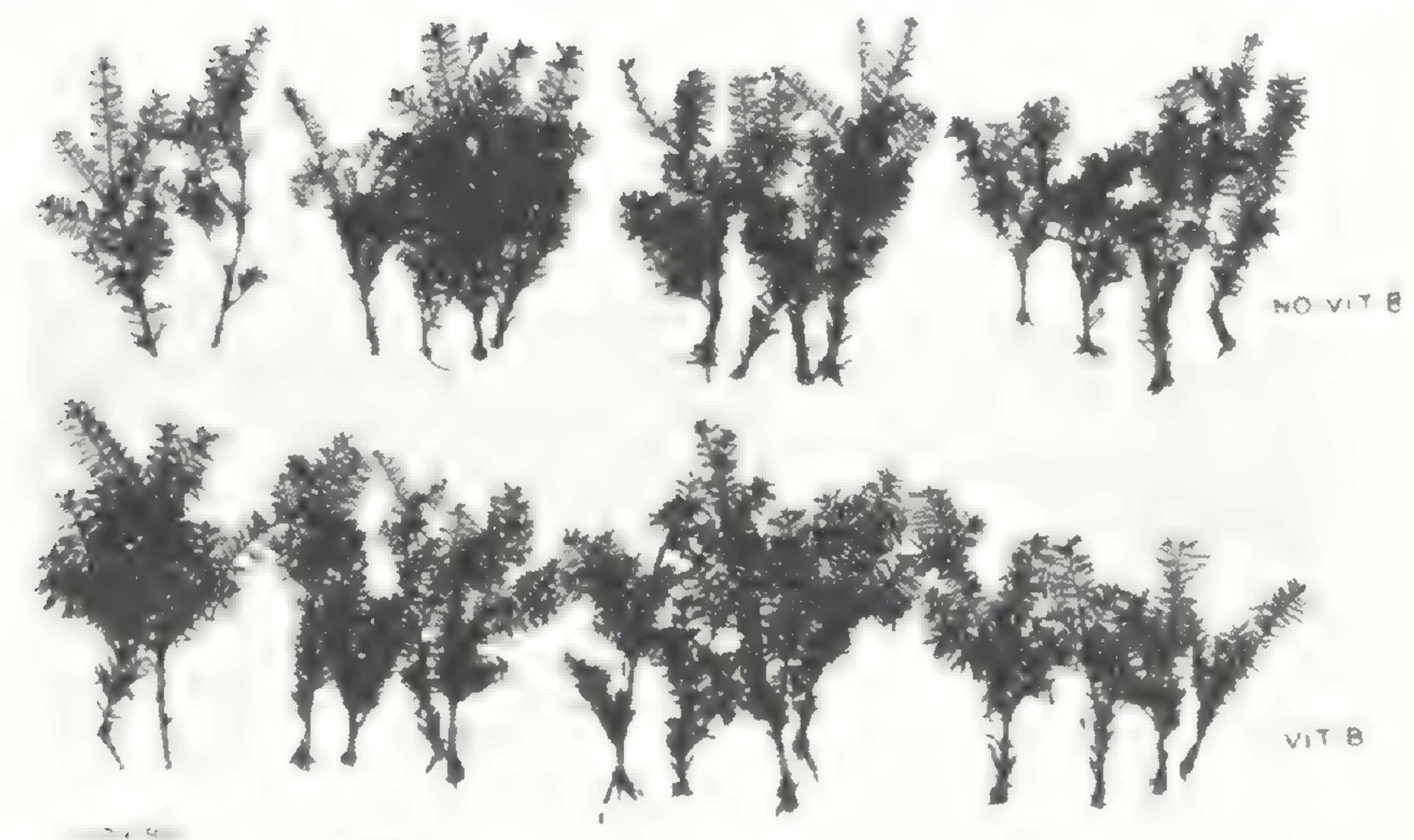


FIGURE 2



FIGURE 4

ROOTING OF SOME CONIFERS FROM CUTTINGS

investigated in more detail. Examples of rooted brachyblasts are shown in figures 3 and 4.

SUMMARY

1. Results on the rooting of cuttings of species of *Abies*, *Tsuga*, *Picea*, *Sequoia*, *Podocarpus*, *Sciadopitys* and *Pinus* are recorded.

2. Rooting was in all cases much higher in the winter months than in the summer, the optimal auxin treatment was either 100 or 200 mg. per liter (for 24 hours), and in extension of the results previously reported, a number of the species rooted considerably more freely when cuttings were taken from young trees than when taken from older stock.

3. In only one instance (*Picea Omorika*) did a treatment with vitamin B₁ noticeably increase the rooting percentage.

4. In *Pinus Strobus* the individual needle-bundles or brachyblasts form roots, particularly in response to auxin treatment, at least as readily as do ordinary cuttings.

LITERATURE CITED

- DEFRANCE, J. A. 1938 a. Propagation of *Sciadopitys verticillata* with root-inducing substances. *Proc. Amer. Soc. Hort. Sci.* **36**: 807-808.
- 1938 b. Propagation of umbrella pine with phytohormones. *Flor. Exch. and Hort. Trade World.* **91**: 12.
- DELISLE, A. L. 1940. Histological and anatomical changes induced by indole-acetic acid in rooting cuttings of *Pinus Strobus*. *Amer. Jour. Bot.* **27** suppl.: 3s.
- DEUBER, C. G. 1940. Vegetative propagation of Conifers. *Trans. Conn. Acad. Arts Sciences*, **34**: 1-83.
- DEUBER, C. G. and J. L. FARRAR, 1939. Rooting Norway Spruce cuttings. *Amer. Nurseryman* **70**: 3-5.
- 1940. Vegetative propagation of Norway Spruce. *Jour. Forestry* **38**: 578-585.
- FARRAR, J. L. 1939. Rooting of Norway Spruce cuttings. *Forestry Chron.*, Sept. 1939: 1-12.
- THIMANN, K. V. and A. L. DELISLE, 1939. The Vegetative propagation of difficult plants. *Jour. Arnold Arbor.* **20**: 116-136.

EXPLANATION OF PLATE

Figure 1. *Abies pectinata* (European silver fir). Left to right: control (water), 100, 200 mg. indole-acetic acid per liter for 24 hours. Cuttings from old tree. Photographed after 6 months in sand.

Figure 2. *Tsuga diversifolia* (Japanese hemlock). Left to right: control (water), 25, 100, 200 mg. indole-acetic acid per liter for 24 hours. Cuttings from trees 6 years old. Photographed after 10 weeks. No effect of B₁ treatment.

Figure 3. *Pinus Strobus* (white pine). Left to right: control (water), 50, 100 mg. indole-acetic acid per liter for 24 hours. Brachyblasts from trees 3 years old. Photographed after 9 months.

Figure 4. As figure 3. A well-rooted brachyblast from tree 80 years old.

HARVARD BIOLOGICAL LABORATORIES,
CAMBRIDGE, MASS.

BONPLAND'S "DESCRIPTION DES PLANTES RARES CULTIVEES A MALMAISON ET A NAVARRE"

WILLIAM T. STEARN

AFTER the death of Etienne Pierre Ventenat in 1808 the Empress Josephine charged Aimé Jacques Alexandre Goujaud Bonpland (1773–1858)¹ with the management of her Malmaison estate near Paris and the description of its rare plants. In 1810, the Navarre estate near Evreux in Normandy was added to his charge. This had belonged in the fourteenth century to Jeanne de France, Reine de Navarre and Comtesse d'Evreux; after Josephine's repudiation by Napoleon in December 1809 it became her chief residence and she set out to create here a garden of rare and beautiful plants such as had been her joy at Malmaison. Pierre Joseph Redouté continued to paint them for her and Bonpland's "Description des Plantes rares cultivées à Malmaison et à Navarre" (folio, Paris) is a sequel to Ventenat's "Jardin de la Malmaison" (2 vols., folio; Paris, 1803–1805).² Both are beautifully illustrated by Redouté. The title-page of Bonpland's book bears the date '1813' but its publication neither began nor ended in that year. References to it in contemporary periodicals show that it

¹See "Aimé Bonpland, Médecin et Naturaliste, Explorateur de l'Amérique du Sud; sa Vie, son Oeuvre, sa Correspondence" (xcvi + 300 pages; Paris, c. 1906) for an account of Bonpland's extraordinarily varied and adventurous career. He was born at La Rochelle, France, in 1773 and died at Restauracion on the Argentine-Brazil frontier in 1858, having settled in South America after the fall of Napoleon. According to Hamy, the family name dating back to the sixteenth century was Goujaud and the name of Bonplant, later Bonpland, was not adopted until about 1778 by Aimé's father, Simon Jacques Goujaud, upon whom it had originally been bestowed as a nickname in allusion to the fact that his father had planted a "bon plant de la vigne" upon the date of his birth:—"Michel Goujaud-Levasseur faisait planter de la vigne . . . lorsqu'on vint lui annoncer la naissance de son deuxième fils Simon-Jacques. Il se serait alors écrié tout joyeux: 'Dieu soit loué! voilà un bon plant! Et pour célébrer la naissance de ce fils, il mit en terre un sarment qui, distingué de tous les autres, fut le bon plant de la vigne. Pour faire allusion à cet incident on désigna dans la famille Simon-Jacques sous le nom de *Bonplant* qui lui resta."

The dates of publication of Humboldt and Bonpland, "Voyage aux Régions équinoxiales, Botanique" (Paris, 1805–34) are given by C. D. Sherborn and B. B. Woodward in Jour. Bot. **39**: 202–205 (1901), and by J. H. Barnhart in Bull. Torrey Bot. Club **29**: 585–598 (1902) and Jour. Bot. **42**: 153–156 (1904). For "Humboldt and Bonpland's Mexican Itinerary" see T. A. Sprague in Kew Bull. **1924**, pp. 20–27, with map; for "Humboldt and Bonpland's Itinerary in Venezuela" see N. Y. Sandwith in Kew Bull. **1925**, pp. 295–310; for "Humboldt and Bonpland's Itinerary in Colombia" see T. A. Sprague in Kew Bull. **1926**, pp. 23–30; these three papers are of great value in fixing the type-localities of species based upon specimens of Humboldt and Bonpland's collecting.

²Of Ventenat's "Jardin de la Malmaison," tt. 1–30 were published in 1803, tt. 31–78 in 1804, tt. 79–84 in Dec. 1804 or Jan. 1805, tt. 85–120 in 1805; for fuller details see Stearn in Jour. Soc. Bibl. Nat. Hist. **1**: 200–201 (1939).

appeared in 11 livraisons (parts) between 1812 and 1817; these notices state the number of plates and sheets of text contained in each part, and the plate- and page-numbers given below have accordingly been deduced from these:—

B.F. = Bibliographie de France (Paris); F.T.G. = Fortsetzung des Allgemeinen Teutschen Garten-Magazins (Weimar); G.A. = Göttingische gelehrte Anzeigen (Göttingen); J.L.F. = Journal général de la Litterature de France (Paris).

Livr. 1, pp. 1-16, tt. 1-6	1812 (Nov. or Dec.)	B. F. 1 : 809 (25 Dec. 1812); J. L. F. 16 : 4 (1813).
Livr. 2, pp. 17-32, tt. 7-12	1813 (Aug. or Sept.)	B. F. 2 : 406 (24 Sept. 1813); G. A. 1814 . 2: 1185 (1814).
Livr. 3, pp. 33-48, tt. 13-18	1814 (Jan.)	B. F. 3 : 26 (28 Jan. 1814).
Livr. 4, pp. 49-60, tt. 19-24	1814 (Nov. or Dec.)	B. F. 3 : 396 (17 Dec. 1814); J. L. F. 18 : 2 (1815); F. T. G. 1 : 212 (1815).
Livr. 5, pp. 61-76, tt. 25-30	1815 (April or May)	B. F. 4 : 225 (20 May 1815); J. L. F. 18 : 164 (1815).
Livr. 6, pp. 77-88, tt. 31-36	1815 (June or July)	B. F. 4 : 316 (22 July 1815); J. L. F. 18 : 227 (1815); F. T. G. 2 : 39 (1816).
Livr. 7, pp. 89-100, tt. 37-42	1816 (June or July)	B. F. 5 : 313 (20 July 1816); J. L. F. 19 : 226 (1816).
Livr. 8, pp. 101-120, tt. 43-48	1816 (Aug. or Sept.)	B. F. 5 : 394 (14 Sept. 1816); J. L. F. 19 : 290 (1816); F. T. G. 2 : 149 (1818).
Livr. 9, pp. 121-144, tt. 49-54	1816 (Oct. or Nov.)	B. F. 5 : 505 (23 Nov. 1816); J. L. F. 20 : 2 (1817).
Livr. 10, pp. 145-152, tt. 55-60	1816 (Nov. or Dec.)	B. F. 5 : 553 (21 Dec. 1816), J. L. F. 20 : 36 (1817).
Livr. 11, pp. 153-157, tt. 61-64	1817 (Mar.-April)	B. F. 6 : 202 (12 April 1817); F. T. G. 2 : 152 (1818).

LINDLEY LIBRARY,

ROYAL HORTICULTURAL SOCIETY,

LONDON, ENGLAND.

STUDIES IN THE LAURACEAE, IV
PRELIMINARY STUDY OF THE PAPUASIAN SPECIES
COLLECTED BY THE ARCHBOLD EXPEDITIONS

CAROLINE K. ALLEN

THIS study includes the Lauraceae from Papuasias in the larger sense. The species below are based principally on the three Brass collections from British and Netherlands New Guinea. Included also are the Brass and Kajewski Solomon Islands specimens and those of Kajewski from the New Hebrides. Some of the Waterhouse plants from Papuasias as well as a few numbers of the Carr collection from New Guinea are cited. It is by no means an exhaustive study, but complete only in so far as the limited amount of material at hand has allowed. Of the large number of lauraceous species described by Teschner in 1923, based on the collections of Schlechter and of Ledermann from Northeastern New Guinea, there were only two types available for study.

The following abbreviations are used indicating in which herbaria the specimens cited are to be found: AA = Arnold Arboretum, Harvard University; G = Gray Herbarium, Harvard University; NY = New York Botanical Garden Herbarium. Thanks are due to the Curators of these herbaria for generous loan of material for study.

Cinnamomum Blume

Cinnamomum solomonense, spec. nov.

Arbor ad 15 m. alta, ramulis glabris striatis rubescentibus. Folia opposita vel subopposita, elliptica, 12–20 cm. longa, 4.5–8 cm. lata, coriacea, acuminata vel attenuato-acuminata, basi anguste cuneata, glabra, triplinervia, nervis utrinque prominentibus quam lamina supra pallidioribus subtus obscurioribus, nervis lateralibus circa 0.5–1 cm. supra basin laminae divergentibus, ad apicem evanescentibus, venis transversis supra inconspicuis subtus conspicuis, petiolis 15–17 mm. longis rubescentibus glabris. Inflorescentia subterminalis, cymoso-paniculata, plus minusve laxa, quam folia brevior, ad 10 cm. longa, ramulis rubescentibus glabrescentibus. Flores ultimi 2–3, dense sericeo-canescienti-pilosi, 3 mm. longi, perianthii lobis pallide viridibus fide coll., pedicellis dense canescienti-pilosis, 3 cm. longis tenuibus. Fructus immaturus, in sicco rubescente-brunneus, glaber, ovoideus, apiculatus, ad 15 mm. longus, 12 mm. latus, calyce crasso ruguloso glabro 10–12 mm. longo undulato suffultus.

SOLOMON ISLANDS: Bougainville: Buin, Kugumaru, *Kajewski 1815* (TYPE, AA), alt. 150 m., common in rain-forest, June 6, 1930 (medium-sized tree up to 15 m. high, flower small, petals light green; fruit immature); Koniguru, *Kajewski 2137* (AA), alt. 900 m., common in rain-forest, Aug. 23, 1930 (small tree up to 8 m. high; fruits green with light minute spots on surface; seeds fleshy, purple in colour, very much like an *Eugenia*; length of fruit including calyx 2 cm., diameter at widest place 1.4 cm.)

(AA); Siwa, *Waterhouse 126* (Yale ser. no. 22837) (AA), Nov. 1932 (small native spice tree with scented bark; leaf glossy; common name: "Enu").

The species differs vegetatively from *C. Massoia* (Becc.) Schewe, its closest relative, if we admit the latter into the genus *Cinnamomum*. Judging from the scant descriptions of literature, differences are apparent in the elliptic or lanceolate leaves (those of *C. Massoia* having a definite tendency towards an oblanceolate condition) and the unmistakable triplinerviate condition (that of *C. Massoia* being according to Schewe¹ semi-trinerviate). *Cinnamomum xanthoneurum* Bl. is in the same group with the two latter-mentioned species, but may be distinguished readily by the canescent-sericeous underleaf surface and the fact that the lateral nerves begin to branch shortly after the middle of the leaf, whereas in *C. Massoia* and *C. solomonense* they remain unbranched until they approach the apex of the leaf.

Kajewski 2137 has been included under this species even though the leaves of that number are on the whole longer than those of the type; the flowers of the former are in a younger stage and the bark of the branchlets gives forth a faint sweetish odor, whereas that of the type is odorless.

***Cinnamomum Clemensii*, spec. nov.**

Arbor parva, ramulis vetustioribus glabris, junioribus sparse pubescentibus, striatis rubescentibus. Folia opposita late elliptica, 10–13 cm. longa, 4–6.5 cm. lata, subcoriacea, acuminata, glabra, juventute haud pubescentia, triplinervia, nervis subtus prominentibus, juventute pubescentibus, mox subglabrescentibus, nervis lateralibus ad basin vel circa 4 mm. supra basin laminae divergentibus, venis transversis subparallelis supra haud, subtus conspicuis, petiolis ad 10 mm. longis rubescentibus, pubescentibus mox glabris. Inflorescentia axillaris cymoso-paniculata, quam folia brevior plus minusve pauciflora, ad 10 cm. longa, flavo-brunneo-pubescentia (in sicco rufescenti-pubescentia) pedunculis tenuibus rubescentibus. Flores 2–3 dense pubescentes, $\pm$ 3 mm. longi, subsessiles (?). Fructus ignotus.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens 3867* (TYPE, AA), alt. 1370 m., forest hills, August 15, 1936 (small tree, flower buds dull brown-yellowish; leaf pale under surface).

The species is outstanding because of the slender inflorescence, few-flowered, long-peduncled for the most part, and with dense brownish red pubescence. The latter is unusual, for in the majority of herbarium specimens of other species the pubescence appears yellowish, greyish or even fuscous. The affinity of the species, not close at best, seems to be with not one but several species from Malaysia.

***Cinnamomum Archboldianum*, spec. nov.**

Arbor ad 6 m. alta, ramulis glabris striatis griseis, ultimis rubescentibus. Folia opposita vel subopposita, lanceolata ellipticave, variabilia, 7–12 cm. longa, 2.5–4 cm. lata, subcoriacea, attenuate subacuminata subcaudatave, falcata, glabra, juventute subtus pallide glaucescentia, triplinervia, nervis prominentibus lateralibus circa 3–5 mm. supra basin laminae divergentibus ad apicem evanescentibus, reticulata, petiolis ad 1 cm. longis rubescentibus

¹O. Schewe in Engl. Bot. Jahrb. **58**: 494. 1923.

glabris. Inflorescentia (racemosa?) quam folia brevior, ad 5 cm. longa. Flores ignoti. Fructus in sicco rubescenti-brunneus, glaber, ovoideus, apiculatus, 10–12 mm. longus, 8–9 mm. latus, calyce gracili crasso dilatato sparse pubescente minusquam 1 mm. longo 4 mm. lato suffultus.

NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8953 (TYPE, AA), alt. 30 m., open second growth on steep dry slopes, July 7, 1938 (tree 5–6 m. high; leaves very prominently 3-nerved).

From description, this species seems most closely related to *C. Englerianum* Schewe. However, it differs in not having reddish branchlets throughout; also there seems to be no trace of the flavo-sericeous pubescence characteristic of the inflorescence of *C. Englerianum*; finally, the conspicuous transverse venation occurring at a definite angle of 60 degrees in the latter species is obscure in *C. Archboldianum*. The leaf-size of *C. Englerianum* is not given by Schewe, and so it is impossible to compare the two on that point.

Superficially *C. Archboldianum* has the appearance of *C. Burmanni* (Nees) Blume from eastern Asia and Malaya, in the leaf shape and variation in size of leaf. The infructescence is similar, as is the fruit, the latter differing only in the somewhat undulate margin of the shallow cupule, as opposed to the definitely partite cupule of *C. Burmanni*. The bark of the branchlets of *C. Burmanni* is reddish brown rather than greyish as in *C. Archboldianum*.

Phoebe Nees

Phoebe Clemensii, spec. nov.

Arbor magna (30 m. alta), diam. 30–60 cm., ramulis juventute striatis dense ferrugineo-tomentosis demum crassis glabris, foliorum delapsorum cicatricibus conspicuis magnis et lenticellis conspicuis notati griseis vel rubescentibus. Folia ad apicem ramulorum plus minusve fasciculata vel subverticillata, obovata, 15–17(–24) cm. longa, 7–9 cm. lata, subcoriacea, (acuminate vel breve acuminata) ad basin attenuata, basi subrotundata vel subauriculata, raro obtusa, supra costa pubescente excepta glabra, leviter ferrugineo-pubescentia, penninervia, nervis 12(–15), satis arcuatis supra impressis subtus elevatis conspicuis, reticulata, petiolis 5–10 mm. longis pubescentibus. Inflorescentia axillaris ex foliorum ultimorum axillis, vel subterminalis, cymoso-paniculata, pauciflora, ad 22 cm. longa, longe-pedunculata, pedunculis $\pm$ 13 cm. longis, breviter tomentosa. Flores ultimi 2–3, dense tomentosi, 5–6 mm. longi, in sicco pallide brunnescentes, perianthii lobis utrinque pubescentibus, pedicellis dense tomentosis $\pm$ 2 mm. longis. Infructescentia crassa, glabrescens. Fructus viridis fide coll., glaucus, glaber, ovoideus, apice obtusus, minute apiculatus, 1.5 $\times$ 1 cm., calyce ligneo crasso persistente subtentus, pedicello ad 2.5 cm. lato incrassato.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 1072 (TYPE, fl., AA), alt. 1000–1200 m., Dec. 3, 1935; *Clemens* 615 (AA), alt. 900 m., forest hills, Oct. 24, 1935 ("big tree," diameter breast high 30–60 cm.; flower dull yellow). BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3829 (fruit, AA), alt. 500 m., rain forest, April 21, 1933 (tree about 30 m. tall, with grey lenticellate bark and tough yellowish wood; leaves clustered at branch ends; peduncles and pedicels red; fruit smooth, green, covered with glaucous bloom).

The parts of the description in parentheses were taken from the Brass number and not from the type. *Clemens 615* is a much smaller-leaved specimen, but the typical leaf-base, the inflorescence with its pale tan tomentose pubescence, and the scarred branches, bearing leaves at their tips, place it without doubt in the above species. *Phoebe Clemensii* is very close to *P. novo-guinensis* Teschn. and to *P. Forbesii* Gamble. In fact, all three are very closely related. Having no specimens of either one, it is necessary to rely on the descriptions. The new species is separated at once from both the others by the abruptly acuminate leaves, roundish to subauriculate at the base, and by the inflorescence being 13–20 cm. long. The leaves of both *P. Forbesii* and *P. novo-guinensis* are more or less acuminate and are acute, cuneate, or attenuate at the base, and the inflorescences are 10–15 cm. long.

The nearest relative outside of New Guinea, as far as can be ascertained from literature, is *Phoebe macrophylla* Bl., from Malaysia, which again has larger leaves with petioles usually much longer (1–2.5 cm.).

Nothaphoebe Blume

Nothaphoebe Archboldiana, spec. nov.

Arbor ad 30 m. alta, ramulis glabris teretibus irregulariter sulcatis griseis, junioribus paullo angulatis striatis rubescentibus vel olivaceis. Folia subverticillata, obovata, 9–18 cm. longa, 2.5–7 cm. lata, coriacea, juniora chartacea, minute pellucido-punctata, obtusa vel obtuse acuminata, basi attenuato-cuneata, penninervia, nervis 8–10 utrinque sub conspicuis, reticulata, subtus reticulo quam supra conspicuiore, petiolis crassis sulcatis ad 1 cm. longis griseis glabris, junioribus gracilibus rubescentibus. Inflorescentia axillaris, cymoso-paniculata, laxa, ad 7 cm. longa, glabra, 3-flora, pedunculis ad 3.5 cm. longis. Flores 2–2.5 mm. longi, albi, margine ciliolato excepto glabri, pedicellis $\pm$ 1 cm. longis gracilibus tubiformibus glabris post anthesin purpurascentibus fide coll. Fructus ruber, fide coll., in sicco nigrescens, glaber, ellipsoideus, 4.2×2.2 cm., pedicello crasso ad 2 cm. longo apice 4 mm. crasso griseo.

BRITISH NEW GUINEA: Lower Fly River, Sturt Island, *Brass 8134* (TYPE, AA), abundant and more or less gregarious on frequently inundated flood plains, Oct. 1936 (tree 30 m. high, developing a complicated maze of slender aerial roots arched over the base silt, the bark thick, grey, lenticellate, the wood pale yellow; flowers white, the pedicels purple after flowering; fruit smooth, red, 4.2 cm. long $\times$ 2.2 cm. diameter; only meagre material available); Wame River, Purari Delta, *Brass 1081* (AA), river bank, rain-forest, Feb. 28, 1926 (shapely tree, 30 ft.; fruit elongated, white, pink-tinged). NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 13118* (AA), alt. 850 m., rare in primary rain-forest of the flat plain, March 7, 1939 (tree 31 m. high, the diameter 73 cm., the crown not widespreading, the bark 14 mm. thick, light brown, fairly smooth, the sap-wood orange, the heart-wood brown-yellow; fruit rose). NORTHEASTERN NEW GUINEA: *Schlechter 18322* (AA), Oct. 3, 1908 (in den Galleria Wäldern am Renija).

This is the first species of *Nothaphoebe* to have been noted from Papuasias. The profusion of obovate subverticillate leaves, the characteristic perianth with the outer cycle of lobes much smaller than the inner, and the typical fruit seated on an enlarged pedicel from which the floral parts have disappeared stamp the species unmistakably as *Nothaphoebe*. The collections

available at present are all placed in one species, despite a few differences. *Brass 1081* from British New Guinea, for example, varies from the others in height.

Actinodaphne Nees

Actinodaphne tomentosa Teschner in Engl. Bot. Jahrb. **58**: 384. 1923.

Inflorescentia (*Clemens 3983*) in toto dense pallide ferrugineo-sericea, umbellulis subsessilibus 1-3 (?). Flores, pedicellis 3-4 mm. longis, perianthii lobis 4, ligulatis, ciliatis, + 3 mm. longis, extus longe-pubescentibus, intus glabris, ovario 2-3 mm. longo, obovoideo, glabro. Fructus brunneo-viridescens, glaber globosus, apiculatus, 7-8 mm. diametro, calyce incrassato, 5-6 mm. lato distenso, pubescente, suffultus, pedicello 5-6 mm. longo, incrassato. (*Clemens 4613, 5144*).

NORTHEASTERN NEW GUINEA: Kaiserin Augusta Fluss, Schraderberg, *Ledermann 11895* (TYPE Berlin, not seen), alt. 2070 m., June 1, 1914; Wälder am Goridjoa, *Schlechter 19818* (ISOSYNTYPE, AA), alt. 1200 m., June 13, 1909; Morobe District, Yunzaing, *Clemens 3983* (fruit, AA), alt. 1370 m., forest hills, Aug. 25, 1936 (small plant, polelike; fruit green); same locality, *Clemens 3749* (AA), alt. 1675 m., forest mountain, July 31, 1936 (small tree 5-7.7 cm. diam. breast high; flower-buds khaki-yellow; leaf pale bluish beneath); Ogeramnang, *Clemens 4613* (fr. AA), alt. 1765 m., forest hills, Dec. 15, 1936 (small tree, diam. breast high 2.5-5 m.; fruit green); same locality, *Clemens 5144* (fruit, AA), alt. 1705 m., forest above rivulet, Jan. 26, 1937 (small-medium tree, diam. breast high 12.7 cm., fruit green).

Clemens 3983 has only ♀ flowers, which are too mature for complete description of staminodia and ovary, but very probably the plant may be found to belong to *Neolitsea*. I have examined in detail *Schlechter 19818* and find no flowers with 6 perianth lobes, as described by Teschner for the species. However, *Ledermann 4895* may have been the sheet chosen by Teschner as the type and he may have drawn up his description from that sheet. The majority of Teschner's new species of *Actinodaphne* from New Guinea are described by him as having a six-lobed perianth. Except for the above species I have seen no material of Teschner's species. Hence, I cannot definitely conclude that the latter belong in *Neolitsea* rather than *Actinodaphne*. The descriptions, however, would indicate that such is the case.

Actinodaphne Brassii, spec. nov.

Arbor parva, ramosissima, ramulis glabrescentibus, ferrugineo-pubescentibus evanidis, nodis exceptis striatis, brunnescentibus viride-brunneisve. Folia verticillata in nodo quove 5-6, plerumque lanceolata, 13-17 cm. longa, 2.5-3 (raro 4) cm. lata, juventute chartacea, maturitate subcoriacea, ad apicem attenuata, rare attenuate acuminata, pallida, maturitate margine undulata, supra in sicco pallida, subtus griseo-glauca, supra glabra subtus glabra vel leviter glabrescentia, penninervia, costa utrinque conspicua, subtus glabrescente, nervis 10-15 inconspicuis, minute reticulata, petiolis juventute ferrugineo-pubescentibus, mox glabrescentibus. Inflorescentia ∞ fasciculata umbellulata vulgo internodalis, ♂ in toto pallide brunneo-sericea, 3-5 umbellulis pedunculatis, pedunculis 10-14 cm. longis, gracilibus pubescentibus, umbellulis 3-5-floris. Flores virides fide coll., + 4 mm. longi pedicellis 2-5 mm. longis, perianthii lobis 5, ovatis, interioribus ciliatis punctatis. Inflorescentia ♀ ignota. Infructescentia pubescens mox glab-

rescens, umbellulorum pedunculis 6 mm. vel brevioribus longis, pedicellis $\pm$ 5 mm. longis. Fructus viride-flavescens, pallide maculatus fide coll., glaber, compresse globularis, apiculatus, 7–9 mm. longus, 9–10 mm. latus, calyce ruguloso pubescente, $\pm$ 2 mm. longo, suffultus.

SOLOMON ISLANDS: *Y s a b e l*: Tasia, *Brass* 3290 (TYPE, AA), common on rocky foreshores, Dec. 6, 1932 (small much-branched tree; young foliage flaccid and drooping, yellow-green; upper side of leaves dull green, the lower side grey; flower green; common name: "Tula"). *F l o r i d a* (*N' g e l a*): Northern end of island, *Brass* 3505 (AA), plentiful in coastal rain-forests, Jan. 25, 1933 (small tree with thin brown bark and pale yellowish wood; leaves undulate, the under side grey; fruit smooth, greenish yellow, with pale mottlings).

A species characteristic in the group because of the lanceolate leaves that have a greyish undersurface. It is very close to *A. solomonensis* Allen, but differs in leaf characters and in the presence of longer peduncles of the umbellules.

***Actinodaphne Archboldiana*, spec. nov.**

Arbor, ramulis fusco-glabrescentibus hinc inde glabratis, striatis, brunneis. Folia verticillata, in nodo quove 5–6, elliptica elliptico-lanceolatave, 14–20 cm. longa, 3.5–7 cm. lata, subcoriacea, subacuminata, longe acuta vel acuta, in sicco nigrescentia, supra glabra nitida, subtus sparse pubescentia mox glabrescentia, glauca fide coll., penninervia, nervis 8–10, utrinque conspicuis prominentibus, subtus parce pubescentibus, ad marginem arcuatis evanidis, venis transversis utrinque inconspicuis, petiolis ad 1.5 cm. longis, fuscentibus, pubescentibus mox glabrescentibus. Inflorescentia ∞ fasciculata umbellulata, vulgo internodalis, ♀ in toto dense cano-sericea, 3–5 umbellulis pedunculatis, pedunculis ad 6 mm. longis, gracilibus, pubescentibus, umbellulis 3–5-floris. Flores ad 3 mm. longi, pedicellis 1–4 mm. longis, perianthii lobis 6, ovatis ciliatis, extus pubescentibus, intus glabris. Inflorescentia ♂ et fructus ignoti.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7493 (TYPE, AA), common sub-canopy tree of poorer type of rain-forest, Aug. 1936 (underside of leaves glaucous).

According to Teschner's key, the new species falls into the verticillate-leaved group, in the bracket "*Petoli tomentosi*," with one other species, *A. tomentosa* Teschner. Although the pubescence on the petioles of the leaves of *A. Archboldiana* is sparse, it is evident that the petioles have become glabrescent with age. *Actinodaphne Archboldiana* is easily separated, however, by the absence of tomentum on the branchlets and the under surface of the leaves. The only other described verticillate-leaved species from New Guinea are *A. nitida* and *A. latifolia*, both described by Teschner, with glabrous petioles. *Neolitsea Vidalii* Merr. from the Philippines, based on *Litsea verticillata* Vidal, is probably an *Actinodaphne* and very closely related to *A. Archboldiana*.

***Actinodaphne solomonensis*, spec. nov.**

Arbor parva ad 15 m. alta, ramulis glabris striatis, viride-brunneis, maculatis. Folia verticillata in nodo quove 5–6, elliptica elliptico-lanceolatave, 14–20 cm. longa, 4–6 cm. lata, subcoriacea, acuminata, longe acuta vel acuta, supra glabra pallida, subtus nervis sparse pubescentibus exceptis

glabra fide coll. cano-argentea, penninervia, nervis 7–10 utrinque conspicuis prominentibus, subtus parce pubescentibus ad marginem arcuatis evanidis, venis transversis utrinque inconspicuis, petiolis 13–20 mm. longis, fuscentibus, pubescentibus mox glabrescentibus. Inflorescentia $\propto$ fasciculata umbellulata, vulgo internodalis, δ in toto brunneo-sericea, (3?–)5 umbellulis pedunculatis, pedunculis 4–9 mm. longis, gracilibus pubescentibus umbellulis 3–5-floris. Flores virides fide coll., pedicellis $\pm$ 5 mm. longis, perianthii lobis 5, ovatis, interioribus ciliatis, quam exterioribus brevioribus, extus pubescentibus punctatis. Inflorescentia φ et fructus ignoti.

SOLOMON ISLANDS: Bougainville: Buin, Kugumaru, *Kajewski 1889* (TYPE, AA), alt. 150 m., rain-forest, June 30, 1930 (small tree up to 15 m. high; leaves white, silvery underneath; buds green, with green sepals, petals, and stamens; wood used for building native houses; common name: "Nagi-a").

This species differs from *A. Archboldiana* in having glabrous green-brown branchlets. Its leaves are glabrous except for the nerves on the lower surface, which are glabrescent to glabrous, and white silvery beneath, not blackening as in *A. Archboldiana*. The herbarium specimens show only a suspicion of glaucosity beneath. On the whole, the petioles of *A. solomonensis* are longer. The δ flowers of *A. solomonensis* are larger than the φ flowers of *A. Archboldiana*; the pubescence of the latter is more brown than whitish.

Neolitsea Merrill

Neolitsea Archboldiana, spec. nov.

Arbor parva, 4–5 m. alta, ramulis brunneo-rubrescentibus, glabris. Folia subverticillata, elliptico-lanceolata, 12–15 cm. longa, 3.5–5 cm. lata, chartacea, longe acuminata subcaudatave, utrinque glabra supra pallide subtus glauca fide coll., penninervia, nervis 4–6, plus subtus quam supra elevatis, utrinque reticulata. Inflorescentia δ , $\propto$ umbellulis breviter pedunculatis vulgo internodalis, 5-floris, bracteis 4, pellucidis extus pubescentibus intus glabris, pedicellis $\pm$ 1 mm. longis, perianthii lobis 4, ligulatis pellucidis, extus pubescentibus intus glabris, staminibus 6. Inflorescentia φ et fructus ignoti.

NETHERLANDS NEW GUINEA: 15 km. sw. of Bernhard Camp, Idenburg River, *Brass 12357* (TYPE δ , AA), alt. 1700 m., common in undergrowth of rain-forest gullies, Jan. 1939 (tree 4–5 m. high; leaves very glaucous underneath; flowers yellow).

A species distinguished by long acuminate or subcaudate leaves and glabrous branches and leaves. Perhaps it is near Teschner's *Neolitsea acuminata*, but the leaves are not obtusely acuminate and are larger. It approaches also *N. glabra* Teschner, but again the leaves are larger, and the costa is only slightly impressed above, if at all.

Neolitsea Brassii, spec. nov.

Arbor 6–7 m. alta, ramulis rubescentibus striatis glabris. Folia alternata, ovata vel elliptico-ovata vel elliptica, 6–9 cm. longa, 3–5 cm. lata, subcoriacea, obtusa vel obtuse acuta, utrinque glabra, opaca subtus grisea, triplinervia, nervis in jugo infimo oppositis ad 0.7 cm. supra laminae basim divergentibus, supra pallidis subtus conspicuis nigrescentibusque, costa supra medium arborescente, venis transversis haud conspicuis, reticulata,

petiolis 1–1.5 cm. longis gracilibus, pubescentibus mox glabris, rubescentibus. Inflorescentia ♂, ∞ umbellulis pedunculatis axillaribus internodalibusque, pedunculis 1–2 mm. longis, 3-floris, bracteis 4, extus pubescentibus intus glabris, pedicellis 3 mm. longis, pubescentibus, perianthii lobis 4, ovatis laceratis, 3 mm. longis extus paullo pubescentibus intus glabris. Inflorescentia ♀ et fructus ignoti.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, *Brass* 8704 (TYPE ♂, AA), common in outskirts of rain-forest, Jan. 1937 (tree 6–7 m., leaves grey underneath; flowers yellow).

Neolitsea Brassii is a distinct species, judging from the descriptions of other species, in that it has the triplinerved venation typical of eastern Asiatic species. It stands out also in perianth characters. The four lobes are only slightly pubescent and are not strap-shaped and acute at the apex but more ovate. The number of flowers in the umbel is less than appears to be usual in the case of the New Guinean species.

***Neolitsea Teschneriana*, spec. nov.**

Arbor parva 6 m. alta gracilis, ramulis gracilibus dense adpresse ferrugineo-pubescentibus. Folia plus minusve subverticillata, elliptico-ovata, 7–12 cm. longa, 3–5.5 cm. lata, chartacea, acuta vel acuminata, saepe falcata, supra sparse minuteque pilosa, pallida, subtus dense ferrugineo-pilosa (praesertim juvenilia), triplinervia, nervis lateralibus 2–5 supra haud subtus prominentibus pubescentibusque, venis transversis subtus aliquid conspicuis, petiolis ad 1 cm. longis dense pubescentibus. Inflorescentia ♂, umbellulis sessilibus vulgo internodalibus, immatura in toto ferrugineo-pubescentibus 5-umbellulis subsessilibus bracteis 4, perianthii lobis 4, ligulatis ciliatis 2 mm. longis extus pubescentibus intus glabris, staminibus 6(?). Inflorescentia ♀ immatura, ∞ umbellulis sessilibus, vulgo internodalibus, ferrugineo-pubescentibus.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 824 (TYPE ♂, AA), alt. 900 m., Nov. 8, 1935 (tree 6 m., slender; flowers yellowish; fruit dark or black); same locality, *Clemens* 1255, alt. 750–990 m., Dec. 19, 1935. BRITISH NEW GUINEA: Owen Stanley Range, between Mts. Brown and Clarence, *Brass* 1510 (♀, AA), alt. 1220–1525 m., May 19, 1926 (tall virgate bush; leaves grey below; flowers white, in lateral clusters).

This species is distinct because of the rusty brown dense appressed pubescence on the slender branchlets and the lower surface of the leaves and petioles. Due to the fact that the flowers are immature, the exact number of stamens is uncertain. From the type of inflorescence and the perianth lobes, and with the data which can be gleaned from the young flowers, it is probable that the number of stamens is six, in accordance with related species of *Neolitsea*.

Clemens 1255 is undoubtedly the same species, but the leaves for the most part appear to be smaller than those of the type. *Brass* 1510 shows slight differences in the less triplinerviate condition of the leaves, but the pubescence, type of inflorescence, etc., make it impossible to associate the number with any other known species or to set it apart as a distinct one. The species is named in honor of Prof. H. Teschner, who has contributed the major portion of the published taxonomic work on Papuan Lauraceae.

Litsea Lamarck***Litsea fulvosericca*, spec. nov.**

Arbor 32 m. alta, ramis glabrescentibus, ramulis minute pubescentibus angulatis ad nodos complanatis brunnescentibus. Folia alternata, elliptica, (4-)8-11.5 cm. longa, (2-)4-5.5 cm. lata, coriacea, obtusa vel subrotundata et leviter retusa, basi attenuata acuta supra glabra, juniora glabrescentia, subtus adpresse fulvo-sericeo-pubescentia, penninervia, nervis 7-8 supra inconspicuis impressis subtus elevatis plus minusve pubescentibus, venis transversis subparallelis inconspicuis, petiolis crassis 0.5-1 cm. longis fuscis minute pubescentibus. Inflorescentiae ♂ et ♀ ignotae. Infructescentia axillaris et caulina, racemosa, ad 3 cm. longa, minute plus minusve fulvo-pubescentia, ad 5-fructigera, pedunculis crassis $\pm$ 1 cm. longis pubescentibus. Fructus ruber fide coll., glaber, ellipsoideus, apice basique attenuatus, 0.1 $\times$ 0.8 cm., calyce undulato patente discoideo glabrescente 6 mm. diam., pedicello crasso 2-3 mm. longo pubescente.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12520 (TYPE fruit, AA), alt. 1200 m., frequent in forest of the slopes, Feb. 15, 1939 (tree 32 m. high, diameter 40 cm.; crown not widespreading; bark 8 mm. thick, brown, scaly; sapwood light brown; heartwood red-brown; fruit dark red).

The most outstanding feature of the species is the fulvous appressed sericeous pubescence on the lower leaf-surface. The small fruits, occurring in racemes on the branchlets or in leaf axils, and subtended by a rigid flaring calyx that is at once disc-like and fluted, present other distinguishing characters.

***Litsea crenata*, spec. nov.**

Arbor magna, ramulis glabris, junioribus griseo-brunneo-pubescentibus, teretibus cicatricosis, cicatricibus foliorum delapsorum striatis griseo-murinis, junioribus rubescentibus, novellis subferrugineo-tomentosis. Folia alternata, irregulariter elliptica, raro subobovata, 6.5-9 cm. longa, 3-4.5 cm. lata, coriacea, obtusa vel obtuse subacuminata, raro acuta, basi cuneata vel obtusa, supra costa et nervis exceptis glabra, subtus pubescentia mox glabrescentia, penninervia, nervis 4-6(-7), inaequalibus, nervis et costa supra impressis canescentibus, junioribus plus minusve subferrugineo-pubescentibus, subtus elevatis subferrugineo-pubescentibus, utrinque minute reticulata, petiolis ad 1.5 cm. longis varie pubescentibus rubescentibus. Inflorescentia ♂ et ♀ ignotae. Infructescentia caulina, ut videtur 1-umbellata, ad 3 cm. longa, pallide brunnescens, glabrescens, pedunculis $\pm$ 5 mm. longis. Fructus niger et nitidus fide coll., glaber, ellipsoideus, apiculatus, 1.8 $\times$ 1.2 cm., calyce crasso undulato-crenato, glabrescente vel glabro, griseo-brunneo 4 mm. longo, 3 mm. crasso.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5469 (TYPE fruit, NY; AA), alt. 1450 m., large tree in oak forest, Nov. 8, 1933 (fruit black, shining). NORTH-EASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 6561A (AA), alt. 1370 m., June 18, 1937; same locality, *Clemens* 6445 (AA), June 21, 1937.

On the whole, the Clemens plants have leaves more glabrous and less irregular as to outline and venation. The specimens are in a younger stage than those of the type, the fruit being immature. Temporarily, at least, they are referred to *L. crenata*. The undulate-crenate disc or calyx subtending the ellipsoid fruit is a good character. The grayish brown or

murinus branchlets, which in the young stages, as well as the young leaves, are covered with almost a ferrugineous pubescence, present another distinction.

***Litsea breviumbellata*, spec. nov.**

Arbor parva, ramulis glabris, junioribus breviter ferrugineo-tomentosis, teretibus striatis griseis vel murinis. Folia alternata, lanceolato-elliptica vel leviter et anguste obovata, 9.5–13.5 cm. longa, 4–5 cm. lata, subcoriacea, acuta vel leviter subacuminata, basi obtusa vel subrotundata, supra costa et nervis exceptis glabra, subtus pubescentia, penninervia, nervis 8–10, supra impressis subtus conspicuis elevatis ferrugineo-tomentosis, venis transversis subparallelis conspicuis, utrinque minute reticulata, petiolis gracilibus ad 1.2 cm. longis ferrugineo-tomentosis mox glabrescentibus. Inflorescentia ♂ axillaris et caulina, fasciculata, 1–3 umbellata, ad 8.9 mm. longa, pedunculis gracilibus 3–4 mm. longis pubescentibus. Flores 4–8 (–?), $\pm$ 3.5 mm. longi, ferrugineo-pubescentes, staminibus exsertis, pedicellis $\pm$ 2 mm. longis pubescentibus. Inflorescentia ♀ axillaris et subterminalis, caulina, fasciculata, 1–3 (–?), umbellata, plerumque singula persistens, ad 8 mm. longa, ferrugineo-pubescentia, pedunculis 2–3 mm. longis pubescentibus. Flores ♀ 3–4 (–?), $\pm$ 3.5 mm. longi, ferrugineo-pubescentes, pedicellis $\pm$ 1 mm. longis. Infructescentia $\pm$ 2 cm. longa, glabrescens, pedunculis crassis ad 1 cm. longis. Fructus probabiliter immaturus?, viridibrunnescens, glaber, ovoideus, apiculatus, 8 $\times$ 5 mm., calyce parvo discoideo $\pm$ 4 mm. diam., pedicello paullo crasso pubescente $\pm$ 3 mm. longo.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7585 (TYPE ♂, AA), Aug. 1936 (small tree of rain-forest substage); same locality, *Brass* 7700 (♀, fruit, AA), in 1936 (rain-forest substage tree).

For the relationships of this species one must look to the Chinese and Indian floras. Most outstanding are the short umbels and exserted stamens of the ♂ flowers, and the warm, light rust color of their pubescence and that of the leaves as well, in the dried state at least. The ♀ flowers are smaller than the ♂ and the branchlets of the former are less grey than reddish brown, with a tendency toward more pubescence in the older parts. Otherwise both specimens are much the same.

***Litsea alveolata*, spec. nov.**

Arbor 5–8–15 m. alta, ramis erectis fide coll., ramulis glabrescentibus angulatis striatis griseo-nigrescentibus, junioribus breviter brunnescentelanatis. Folia alternata, subrotundata, plus minusve rotundato-ovata, elliptica, 7 mm.–9 cm. longa, 6 mm.–4 cm. lata, percoriacea, apice basique rotundata, saepe leviter obtuse subacuta, margine revoluta, brunnea fide coll., supra costa nervisque exceptis glabra, juniora pubescentia, subtus dense breviter brunneo-lanata, penninervia, nervis 4–6 (plerumque 5) 30° sub angulo divergentibus, supra perimpressis subtus elevatis brunneis utrinque pubescentibus supra inconspicue subtus conspicue et prominenter alveolata, petiolis crassis $\pm$ 1 cm. longis fuscis pubescentibus. Inflorescentia ♂ axillaris et terminalis (?) umbellato-racemosa, ad 3 cm. longa, umbellis ad 10, infimis mox deciduis, 3–4 apicalibus persistentibus pubescentibus, bracteis 4 pubescentibus glaucis, pedunculis 1–3 mm. longis pubescentibus. Flores $\pm$ 2, 2–2.3 mm. longi, flavi fide coll., extus longe sparseque ferrugineo-pubescentes, intus glabri, perianthii lobis 6–8-ciliolatis. Inflorescentia

♀ ignota. Infructescentia ut videtur terminalis, brevis, $\pm$ 3.5 cm. longa, glabra, plerumque fructum unicum maturante. Fructus brunnescens, in sicco nitidus, rugosus, glaber, ellipsoideus, apice basique attenuatus, apiculatus, $\pm$ 2.5 cm. longus, $\pm$ 1.3 cm. latus, calyce crasso patenti-discoideo glabro $\pm$ 1 cm. diam., pedicello crasso griseo rugoso $\pm$ 5 mm. longo, 5–6 mm. lato.

NETHERLANDS NEW GUINEA: Lake Habbema, 3225 m. camp, *Brass* 9559 (TYPE ♂, fruit, AA), alt. 3225 m., common in mossy closed forest, Aug. 1938 (tree 5–8 m. high; branches erect; foliage brown); 9 km. ne. of Lake Habbema, 2800 m. camp, *Brass* 10708 (♀ AA), alt. 2800 m., plentiful in forest substage, Oct. 1938 (tree attaining 15 m.; flowers yellow).

This species is very close to *L. Versteeghii* Allen, the main difference being the size of the leaves. The former has leaves usually 8–9 cm. long, the latter 3–4 cm. long. Both, however, have the same range in leaf length. The lateral nerves of *L. alveolata* tend to branch at an angle of 30° , whereas those of *L. Versteeghii* approach 45° . *Litsea Versteeghii* has longer inflorescences with a larger number of flowers persisting at the tip, but on the bracts enclosing the umbels on both species there is a conspicuous bloom. The ultimate reticulation of the leaves of *L. Versteeghii* is rather more coarse and more apparent on the upper surface than the fine alveolate condition of those of *L. alveolata*. On the lower surface of *L. alveolata* the heavy lanose pubescence, instead of obscuring the alveoli, makes them even more striking.

***Litsea Versteeghii*, spec. nov.**

Arbor ad 25 m. alta, ramulis glabrescentibus mox glabris, junioribus dense pallide brunneo-tomentosis, rimosis griseis. Folia alternata, elliptica, ad 10.5 cm. longa, 4–5.5 cm. lata, coriacea, rotundata vel obtusa, supra nervis costaque exceptis glabra, subtus dense mollissime pubescentia, mox sparse pubescentia, penninervia, nervis 5–7 utrinque pubescentibus mox glabris supra impressis subtus elevatis, venis transversis subtus conspicuis, supra areolata, subtus conspicue reticulata, petiolis crassis ad 1.5 cm. longis, fuscis glabrescentibus, junioribus dense pubescentibus. Inflorescentia ♂ axillaris, in axillis foliorum delapsorum umbellato-racemosa, ad 6.5(–8) cm. longa, umbellis numerosis, infimis mox deciduis, 3–12 apicalibus maturantibus pubescentibus + 4-floribus, bracteis 4 extus pubescentibus glaucis pubescentibus conspicue venosis, ciliolatis glanduloso-punctatis, pedunculis ad 1 cm. longis pubescentibus. Flores 3–4 mm. longi, extus longe rubescenti-pubescentes, minute punctati. Inflorescentia ♀ et fructus ignoti.

NETHERLANDS NEW GUINEA: Bele River: 18 km. ne. of Lake Habbema, 2200 m. camp, *Brass & Versteegh* 11162 (TYPE ♂, AA), alt. $\pm$ 2400 m., rare tree of secondary forest, on the slope of a ridge, Nov. 25, 1938 (tree 25 m. high, diam. 35 cm.; crown not widespreading; bark 3 mm. thick, fairly smooth; wood soft brown; unopened flowers green; open flowers brown); same locality, *Brass* 11466 (AA), alt. 2450 m., occasional tree in forest undergrowth, Nov. 1938 (tree 5–6 m. high; leaves stiff, glaucous underneath; flowers brown).

This species is unusual in that the umbels of the lower two-thirds of the raceme are deciduous, only about twelve or less remaining on the stalk. The umbels themselves are rather long, pedunculate, and subtended by pubescent glaucous bracts. The leaves are areolate above, softly pubescent

and glaucous below, and reticulate. The branches are greyish with longitudinal fissures which may indicate lenticels. Only occasionally are the fissures horizontal. In spite of the difference in the height of the tree, there seems to be no doubt that *Brass 11466* is conspecific with the type. The collection represents an earlier stage than the type, for the umbels have not yet fallen from the lower part of the raceme.

***Litsea papillosa*, spec. nov.**

Arbor parva, ad 15 m. alta, ramulis glabris subteretibus striatis griseis, junioribus fuscis. Folia alternata, oblonga vel oblongo-elliptica, ad 12 (?) cm. longa, ad 6 cm. lata, subcoriacea, acuta, basi acuta vel cuneata, utrinque glabra, supra obscure, subtus conspicue dense minuteque papillosa, penninervia, nervis plicatinerviis 4-5 supra paullo elevatis subtus conspicue elevatis, costa supra impressis, subtus elevatis, venis transversis supra conspicuis subtus satis obscuris, petiolis aliquid crassis, canaliculatis ad 8 cm. longis fuscis glabris. Inflorescentia ♂ breve, axillaris et caulina, brachypodiis brevibus, subumbellatis sessilibus fasciculatis glabris 5 mm. longis. Flores post anthesin pallide virides fide coll. Inflorescentia ♀ ignota. Infructescentia ad 2 cm. longa, glabra, ad 7-fructigera. Fructus aurantiacus, glaber, subglobosus, apiculatus, 8×6.5 mm. (fide coll. 10×9 mm.) calyce crassato discoideo 3 mm. diam. subtentus, pedicello crassato ad 7 mm. longo basi 1 mm., apice 2 mm. diam., brunnescente glabro.

SOLOMON ISLANDS: Guadalcanal: Ulololo, Tutuve Mt., *Kajewski 2563* (TYPE ♂, AA), alt. 1200 m., common in rain-forest, April 24, 1931 (small tree up to 15 m. high; flower light green; fruit orange when ripe, length 1 cm., diameter 9 mm., with circle at end; the kernels of this fruit are eaten by the natives; common name: "Com comu").

Although the leaves are fragmentary and there are no flowers left, the characters of this species are such that it must be recognized at once as new. The papillose or glandular condition of the subcoriaceous, more or less oblong leaves, few-veined and plinerviate, are distinctive. The numerous inflorescences borne in fascicles on short brachypods represent a character easily recognised. There is a possibility that this might be a *Lindera*, but the leaves and general habit seem to deny it a place in this genus, and so for the present I place it in *Litsea*.

***Litsea habbemensis*, spec. nov.**

Arbor 29 m. alta, ramulis glabrescentibus mox glabris, junioribus pallide denseque adpresse ferrugineo-pubescentibus angulatis ad nodos complanatis, striatis nigrescentibus. Folia alternata, variatim elliptica, ad 11 cm. longa, ad 5 cm. lata, coriacea, subacuminata vel subacuta, basi cuneata, raro rotundata, raro inaequalia, utrinque glabra, in sicco subcastanea, penninervia, nervis 4-6, supra impressis subtus elevatis, obscure plicatinerviis, venis transversis parallelis subtus conspicuis, supra conspicue subtus obscure reticulata, petiolis gracilibus 2 cm. longis, nigrescentibus pubescentibus mox leviter glabrescentibus. Inflorescentia ♂ axillaris, subumbellato-racemosa, umbellis inferioribus cito deciduis, ad 3 cm. longa, ferrugineo-pubescentibus, bracteis 4, umbellis 2-8, 5-6 mm. longis. Flores ± 5 , ad 5 mm. longi, flavi, fide coll., adpresse sericeo-fulvo pubescentes, pedicellis 3 mm. longis adpresse fulvo sericeo pubescentibus. Inflorescentia ♀ et fructus ignoti.

NETHERLANDS NEW GUINEA: Bele River, 18 km. ne. of Lake Habbema, 2200 m. camp, *Brass & Versteegh 11155* (TYPE ♂, AA), alt. $\pm$ 2350 m., occasional in primary rain-forest, Nov. 22, 1938 (tree 29 m. high, diameter 33 cm.; crown not widespreading; bark 6 mm. thick, grey, rough; wood dark yellow; flowers yellow).

The numerous pedunculate umbels, pale reddish brown in color, and the glabrous reticulate leaves, more or less castaneous below, present a striking contrast with the blackish angled branchlets somewhat flattened at the nodes. The venation of the leaves is very well defined. The costa and lateral nerves are as conspicuous above by being extremely impressed as below by being elevated.

Litsea morobensis, spec. nov.

Arbor, ramis glabris teretibus striatis griseis brunneo-maculosis, ramulis breviter rubescenti-pubescentibus subangulatis. Folia opposita, lanceolata, 6.5–17 cm. longa, 2.5–5 cm. lata, coriacea, obtusa, raro obtuse subacuminata vel retusa, basi obtusa, supra glabra, subtus rubescenti-pubescentia, penninervia, nervis 5–8, supra impressis subtus elevatis brunnescentibus, venis transversis supra magis obscuris subtus conspicuioribus, subtus reticulata, petiolis 1–2.5 cm. longis rubescentibus minute pubescentibus. Inflorescentia ♂ axillaris et caulina, fasciculata, umbellata, 0.5–2 cm. longa, minute rubescenti-pubescentia, pedunculis gracilibus ad 1.5 cm. longis, bracteis 4, rubescenti-pubescentibus glanduloso-punctatis, marginibus scariosis, ciliolatis. Flores $\pm$ 3 extus rubescenti-pubescentes. Inflorescentia ♀, ♂ similes. Fructus ignotus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramnang, *Clemens 5327A* (TYPE ♂, AA), alt. 1765–1830 m., Feb. 8, 1937; *5539* (♀, AA), alt. 1765 m., March 1, 1937.

The specimens are poor, but do not match any other known species. There is a similarity to several Pacific Island species, but variation appears on detailed examination. There seems to be no outstanding characters that mark the species as distinct. More abundant material will probably reveal distinctions or place it within the limits of an already known and variable species.

Litsea perlucida, spec. nov.

Arbor magis gracilis 20 m. alta, ramulis glabris teretibus striatis griseo-rubrescentibus. Folia alternata, late elliptica, (12–)15–18 cm. longa, (6.5–)10–10.5 cm. lata, coriacea, utrinque rotundata, saepe retusa, utrinque glabra, supra perlucida, subtus leviter glauca fide coll., utrinque in sicco castanea, penninervia, nervis $\pm$ 8, infimis $\pm$ 30° sub angulo divergentibus utrinque conspicuis flavo-brunneis, fide coll., in sicco brunneis supra planis subtus leviter elevatis, costa crassa utrinque conspicua subtus elevata, petiolis crassis 2.5–4 cm. longis nigrescentibus glabris. Inflorescentia ♂ axillaris et caulina, fasciculata, 1–2-umbellata, ad 1.5 cm. longa, glabra, pedunculis gracilibus $\pm$ 1 cm. longis, bracteis $\pm$ 6, extus pilosis marginibus scariosis glandulo-punctatis. Flores $\pm$ 5, $\pm$ 3 mm. longi, pallide flavi, fide coll., perianthii lobis extus pubescentibus glanduloso-punctatis, staminibus $\pm$ 12. Inflorescentia ♀ et fructus ignoti.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass 5378* (TYPE ♂, AA), alt. 1100 m., common in second storey of tall lower level forest, Oct. 26, 1933 (rather slender tree 20 m. high; bark dark brown, finely scaly; leaves glossy, slightly glabrous (glaucous?) underneath, the nerves conspicuous, yellow-brown; flower pale yellow).

Very striking is this species, glabrous except for leaf buds and flowers. The very broadly elliptical glossy leaves, rounded at base and apex, with conspicuous yellow nerves, in dried state brownish against the lighter chestnut of the leaf blade, are supported by stout glabrous black petioles up to 4 cm. long. The foliage and black petioles present a strong contrast to the greyish branchlets exfoliating to show here and there patches of red.

Litsea Brassii O. C. Schmidt in White in Jour. Arnold Arb. **10**: 214. 1929.

BRITISH NEW GUINEA: Lower Fly River, Gaima (E. bank), Brass 8286 (AA), common in rain-forest outskirts, Nov. 1936 (small tree 4-5 m. high; leaves greyish pubescent below).

Litsea bernhardensis, spec. nov.

Arbor $\pm$ 30 m. alta, ramulis minute denseque atro-rubescenti-pubescentibus angulatis. Folia alternata, obovata, 18-23 cm. longa, 12-14 cm. lata, subcoriacea, acuta vel abrupte obtuse acuminata, basi rotundata, raro subaequalia supra glabra, subtus glauca, sparse atro-rubescenti-pubescentia, in sicco viridescenti-brunnea, penninervia, nervis 8-10, supra impressis subtus elevatis conspicue atro-rubescenti-pubescentibus, venis transversis supra obscuris subtus conspicuis subparallelis, petiolis crassis, ad 4.5 cm. longis minute atro-rubescantibus. Inflorescentia δ et η ignotae. Infructescentia axillaris et caulina, breviter pedunculata, 1-2 umbellata, ad 4 cm. longa, atro-rubescens, umbellis pedunculis crassis. Fructus sessiles, virides fide coll., glaber, subglobosus, apiculatus, 11 $\times$ 10 cm., calyce discoideo crasso rugoso-striato glabro $\pm$ 8 mm. diam., tubo $\pm$ 1 cm. longo rugoso-striato, apice $\pm$ 6 mm. lata.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, Brass & Versteegh 13568 (TYPE, AA), alt. 570 m., occasional tree of primary rain-forest on the slope of a ridge, April 13, 1939 (tree $\pm$ 30 m. high, diameter 51 cm.; crown not widespreading; bark 15 mm. thick, brown, scaly, rough; wood brown; fruits green).

So outstanding is the fruiting specimen of this species that there seems to be no doubt that it is new. The large obovate leaves are dark on the herbarium specimen and rather sparsely covered on the lower surface with reddish black curly pubescence. The same type of pubescence, but shorter and closer, is found on the branchlets and petioles. The venation of the leaves is also reddish black. The short disc-like calyx and the thickened tube are also distinctive.

Litsea Whiteana, spec. nov.

Arbor ad 20 m. alta, ramulis ferrugineo-pubescentibus mox glabrescentibus demum glabris teretibus striatis pallide rubescenti-brunnescentibus. Folia alternata, elliptica vel obovata, 17-21 cm. longa, 8.5-10 cm. lata, chartacea vel leviter subcoriacea, acuta vel obtusa, supra glabra, subtus sparse pubescentia, in sicco subcastanea, penninervia, nervis $\pm$ 15 supra impressis subtus elevatis pubescentibus rubescentibus, inferioribus subhorizontalibus ad apice sub angulo 45° divergentibus, costa supra conspicua leviter canaliculata subtus elevata rubescentia, venis transversis subtus leviter elevatis, supra minute punctata, subtus reticulata, petiolis crassis $\pm$ 2 cm. longis rubescentibus dense breviter ferrugineo-pubescentibus mox glabris. Inflorescentia δ immatura, axillaris et caulina, subfasciculato-7-10-umbellata, ad 1-1.5 cm. longa, dense breviter ferrugineo-pubescentibus,

bracteis 4 canescentibus sparse rubescenti-pubescentibus, pedunculis $\pm$ 5 mm. longis umbellarum pedunculis $\pm$ 5 mm. longis. Flores solitarii, immaturi, perianthiis nullis, staminibus numerosis $\pm$ 15. Inflorescentia $\varnothing$ breviora, quam σ , fasciculato-10-14+-umbellata, umbellarum pedunculis $\pm$ 1.5 mm. longis, bracteis 4 extus sparse pubescentibus glanduloso-punctatis marginibus scariosis. Flores solitarii, subsessiles, $\pm$ 2.5 mm. longi, perianthiis nullis vel abortivi, staminodiis numerosis, $\pm$ 16, variabilibus, ovarium probabiliter ovoideum, pubescens, stigmatibus sessilibus, pseudopeltato, fimbriato, crenulato. Fructus ignotus.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2034 (TYPE σ , AA), alt. 850 m., common in rain-forest, Aug. 7, 1930 (medium-sized tree up to 20 meters high; buds green; sepals green; receptacle red; stamens numerous, cream green; wood used for rafters in ceremonial houses; common name: "Kokitie-kegie"); Kugumaru, Buin, *Kajewski* 1922 ($\varnothing$, AA), alt. 150 m., common in rain-forest, July 4, 1930 (medium-sized tree up to 20 meters high; buds green; common name: "Mar-gul-ah-tuku").

A large-leaved species with reddish brown branchlets. The leaves of the $\varnothing$ specimen are larger than those of the σ and are more nearly chartaceous than subcoriaceous; also the pubescence throughout is more dense.

The species is named for Mr. C. T. White, Government Botanist of the Brisbane Botanical Gardens, long interested in the Papuan flora.

***Litsea perglabra*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris teretibus dense striatis griseis vel pallide rubescentibus. Folia alternata, elliptica, (12-)14-21 cm. longa, (6.5-)7-9.5 cm. lata, coriacea, obtusa, raro retusa, basi acuta, inaequalia, glabra, in sicco viridescenti-castanea, penninervia, nervis $\pm$ 8 utrinque conspicuis, in sicco rubescentibus subtus elevatis, costa supra impressa subtus conspicuis elevatis, petiolis sat crassis ad 3.5 cm. longis rubescentibus glabris. Inflorescentia σ immatura, axillaris, fasciculata, 5+-umbellata, ut videtur breviter pedunculata, ad 8 mm. longa, minute brunneo-pubescentibus, bracteis pubescentibus glanduloso-punctatis. Flores +-4, perianthii lobis extus pubescentibus, glanduloso-punctatis. Inflorescentia $\varnothing$ ignota. Infructescentia $\pm$ 5 cm. longa, glabra, 1-2-fructigera fide coll. Fructus ruber, maculosus fide coll., glaber, ellipsoideus, 3 $\times$ 2 cm., calyce patelliformi, rigido leviter undulato glabro, in sicco brunneo, pallide guttato striato 4 mm. longo 2 cm. diam., pedicello crasso 4 mm. longo apice 6 mm. lato, pedunculo crasso striato brunneo 6 mm. longo.

SOLOMON ISLANDS: Guadalcanal: Berande, *Kajewski* 2414 (TYPE σ , AA), common in rain-forest at sea level, Jan. 6, 1931 (large tree up to 20 m. high; well advanced flower buds only on specimens; this timber is used by the natives in house-building); San Cristoval: Waimamura, *Brass* 2714 (fruit, AA), common in rain-forest on coastal hills, Aug. 22, 1932 (erect tree 10 m. high, with thin brown bark; leaves glaucous below; petioles, midrib and main nerves yellowish; fruit solitary or in lateral prs. below leaves, 4.5 cm. long by 2.5 cm. diam., smooth, dark mottled red, resting in an enlarged truncate calyx).

So close is this species seemingly to *L. perlucida* (described above) that it was set apart as distinct with some hesitation. The main reason was the difference in number of petals and stamens. *Litsea perlucida* has eight petals and sixteen or more stamens, whereas *L. perglabra* has four petals and about twelve stamens. The obvious difference is the shape of the leaves,

their other characteristics being the same. Brass mentions in the field notes for number 2714 the glaucous lower leaf surface and the yellowish nerves.

***Litsea solomonensis*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris teretibus striatis rubescentibus griseo-maculatis, junioribus rubescentibus sparse pubescentibus. Folia alternata, late lanceolata, saepe oblique, 12–15(–20) cm. longa, 3.5(–6.5) cm. lata, chartacea vel subcoriacea, obtusa vel attenuato-acuta, saepe mucronata utrinque glabra, subtus argentea fide coll., penninervia, nervis ad 6, gracilibus supra pallidis subtus leviter elevatis sub angulo $\pm 45^\circ$ divergentibus, supra plus minusve reticulata, petiolis ad 1.5 cm. longis fuscis glabris. Inflorescentia δ axillaris vel caulina, fasciculata, 2–3 umbellata, ad 2.3 cm. longa, minute pubescens, bracteis 4, ciliolatis marginibus scariosis glanduloso-punctatis laceratis, pedunculatis gracillimis ad 1.5 cm. longis. Flores ± 5 , 6–7 mm. longi, extus pubescentes, albi, fide coll. Inflorescentia η ignota. Infructescentia ad 3 cm. longa, pedunculis crassis glabrescentibus. Fructus rubescens, maculatus fide coll., glaber, compresso-globosus, 1.5 cm. longus, 1.2 cm. latus fide coll., cupula 4 mm. longa, 1.2 cm. diam., glabrescente minute tuberculata, pedicello crasso fusco ad 4 mm. longo.

SOLOMON ISLANDS: **Y s a b e l**: Maringe, *Brass* 3183 (TYPE δ , AA), alt. 150 m., rain-forests on limestone hills, Nov. 23, 1932 (tree 20 m. tall; bark greenish tuberculate, brown when cut; leaves pale, slightly grey beneath; flowers white; common name: "Nolahi"). **B o u g a i n v i l l e**: Marmaromino, *Kajewski* 2200 (fruit, AA), alt. 50 m., common in rain-forest, Sept. 29, 1930 (medium-sized tree up to 20 meters high; leaves green on top, silvery underneath; fruit pink, green when ripe; calyx adhering to fruit, length 1.5 cm., diameter 1.2 cm., flattened at one end and covered with light spots; common name: "Lu-ellia"); same locality, Kugumaru, Buin, *Kajewski* 1846 (AA), alt. 150 m., common in rain-forest, June 10, 1930 (large tree up to 20 meters high; leaves silvery beneath; well advanced green flower-buds only on specimen; common name: "Tuge-lear"). **S a n C r i s t o v a l**: Waimamura, *Brass* 2652 (AA), one tree seen in lowland rain-forest, Aug. 15, 1932 (tree 50 ft. tall, with thin brown bark marked with narrow slightly raised horizontal lines; wood soft, yellow; leaves stiff, grey below; unripe fruit bright red; ripe fruit reddish black, about 1.5 cm. diam.; fruiting calyx coloured green). **G u a d a l c a n a l**: Ma-massa, Konga, *Kajewski* 2470 (AA), alt. 500 m., common in rain-forest, Feb. 8, 1931 (medium-sized straight-barrelled tree up to 20 m. high; fruit plum-coloured when ripe, length 1.5 cm. diam. 1.4 cm., with a flattened end; the bark of this tree is macerated with water and applied to sore legs; common name: "Arli-arli"). **M a l a i t a**: Quoi-mon-apu, *Kajewski* 2350 (AA), common at sea level in rain-forest, Dec. 13, 1930 (medium-sized tree up to 20 m. high; leaves silvery underneath; bracts green, enclosing 5 flowers radiating out from the stem; this wood is used for making uprights of houses by the natives; common name: "Sa-sar-su").

BRITISH NEW GUINEA: Lower Fly River, E. bank opposite Sturt Island, *Brass* 8106 (AA), a common substage tree on flood plains in rain-forest, Oct. 1936 (leaves grey underneath; flowers yellow).

Apparently the species is wide-spread throughout the Solomon Islands and is common in New Guinea, fide coll., even though only a single collection from the latter island is at hand. The pale lower surface of the blunt lanceolate leaves is a striking feature. Distinct also are the slender peduncled umbels of the δ inflorescence and the flattened globose fruit subtended by a somewhat shallow cupule which, as the fruit shrinks in drying, flattens and becomes fluted. The striate branchlets, reddish with greyish maculations, are consistent throughout. The New Guinean speci-

men has larger leaves but can in no other way be separated from those from the Solomon Islands. It is necessary to turn to species from Malaysia and from the Philippines to find any affinity to *L. solomonensis*, and even so the relationship is not close. Vegetatively the new species resembles *L. cambodiana* Lctc. from Indochina, but the similarity ends there, for the latter has a racemose instead of umbellate inflorescence.

***Litsea complanata*, spec. nov.**

Arbor, ramulis minute sparseque puberulentibus teretibus, junioribus angulatis et complanatis, striatis pallide brunneo-maculosis lenticellatis atro-brunnescentibus. Folia alternata, elliptica vel oblongo-elliptica, 13–22 cm. longa, 6–11 cm. lata, chartacea, obtuse acuminata, acumine mucronulato, raro obtuse acuta, basi cuneata vel acuta, utrinque glabra, supra atro-brunnescentia, subtus pallida, penninervia, nervis 3–4 (–5) plerumque alternatis, nervis et costa supra puberulis leviter elevatis subtus glabris conspicue elevatis atro-brunnescentibus angulatim arcuatis, venis transversis utrinque conspicuis, petiolis satis gracilibus 3–4 cm. longis atro-brunnescentibus glabris. Inflorescentia ♂ axillaris et caulina, numerosa, racemosa, vel racemoso-paniculata, 2–4 cm. longa, glabrescens, junior pallide pubescens, umbellata, bracteis minutis ad 1 mm. longis dense pubescentibus persistentibus glanduloso-punctatis, umbellis 4–5 apicalibus exceptis cito deciduis. Flores ± 4, 3–4 mm. longi, extus pubescentes, pedicellis 3 (–5) cm. longis gracilibus pubescentibus. Inflorescentia ♀ et fructus ignoti.

NORTHEASTERN NEW GUINEA: Morobe District, Butung R., *Clemens* 5358 (TYPE: ♂, AA), alt. 870 m., Feb. 9, 1937; Sattelberg, *Clemens* 1891 (AA), alt. 1050 m., Feb. 1936; Sattelberg, *Clemens* 1061 (AA), alt. 1020–1220 m., Dec. 3, 1935.

The dark, blackish-brown, terete, striate stems, covered with paler brownish lenticels about which is a distinct patch of color, represent an unusual character. The very young branchlets appear distinctly angular and flattened, particularly at the nodes. The chartaceous leaves, darkened above and paler below, with few (3–4–5) lateral nerves, usually not all opposite, which are arcuate and more often than not angularly so, present another character. The tip of the leaf varies from obtusely acuminate to narrowed to an obtuse tip; the tip in all cases bears a persistent mucron which has grown faster than the surrounding leaf tissue, the latter often appearing to be involute about the mucron. The numerous inflorescences, usually more than one from an axil, may branch into three at the tip, but usually there is a single stalk with 4–5 persistent flowers near the apex. The rest of the flowers are very quickly deciduous after the inflorescence reaches its full length, leaving only the small pubescent bracts on the branchlets. *Clemens* 1891 has smaller leaves and more numerous inflorescences, but there seems no doubt of its being conspecific with the other numbers.

***Litsea domarensis* O. C. Schmidt in White in Jour. Arnold Arb. 10: 215. 1929.**

Inflorescentia ♀ axillaris vel caulina, fasciculata plus minusve umbellata, ad 1.3 cm. longa, breviter dense pallide ferrugineo-sericeo-pubescens, umbellis plerumque 2–3 persistentibus, bracteis 4, pubescentibus ciliolatis. Flores ± 6, 4.5 mm. longi, brunnescentes, argenteo-pubescentes, perianthii lobis 6, 2 mm. longis, tubo 2.5 mm. longo, pedicello 0.5 mm. longo. Infruc-

tescentia ad 2.5 cm. longa, pedunculis plerumque gracilibus subangulatis striatis leviter pubescentibus. Fructus nitidus, niger fide coll., glaber, ellipsoideus, $\pm 11 \times 9.5$ mm., fide coll., cupula incrassata, rugosa leviter pubescente ± 5 mm. longa, ± 8 mm. diam., pedicello satis crasso pubescente ad 4 mm. longo.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7559 (♀, AA), common in rain-forest substage, Aug. 1936 (tree 14–15 m. high); Lower Fly River: E. bank opposite Sturt Island, *Brass* 7982 (AA), common on the lower ridges in rain-forest, Oct. 1936 (spur-buttressed canopy tree 25 m. high; bark close, lenticellate; leaves grey underneath; fruit smooth, shining, black, $\pm 11 \times 9.5$ mm.). NORTH-EASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 1893 (AA), alt. 990 m., forest hills, Feb. 21, 1936 (tree, dbh. 15.2–21 cm.; flower buds grey-yellowish); same locality, *Clemens* 1896 (AA), alt. 750–900 m., Feb. 25, 1936; Finschafen, hospital hill, *Clemens* 79, (AA), alt. 150 m., Sept. 5, 1935 (tree 12–15 m.; branches low; buds cream; fruit green).

SOLOMON ISLANDS: Guadalcanal: Uulolo, Tutuve Mt., *Kajewski* 2578 (AA), alt. 1200 m., common in rain-forest, April 26, 1931 (small tree up to 10 m. high; well advanced flower buds on specimens covered with brown hair; common name: "Latembutu").

?NEW BRITAIN. Boava area: *Waterhouse* 283 (*Yale Ser. No.* 27594) (NY), July-Aug. 1934 (leaves tough; common names: "Pulotabu," "Kaviti").

The fruiting specimen *Brass* 7982 is less pubescent than the type, but there can scarcely be a doubt of its being conspecific with *L. domarensis*. *Clemens* 79 from Finschafen was collected at a lower elevation (500 ft.) than the other Clemens numbers. It is a ♀ specimen and shows a deviation from the type in a few minor details. Nevertheless, this seems to be the most logical disposition of it.

***Litsea mafuluensis*, spec. nov.**

Arbor gracilis 15–20 m. alta, ramulis teretibus striatis griseis, ultimis rubescentibus lenticellatis. Folia alternata, elliptica vel obovato-elliptica, (10–)16–21 cm. longa, (4.5–)7–9 cm. lata, subcoriacea, acuminata vel obtuse acuta, basi acuta, supra glabra, costa excepta, subtus breviter pallide pubescentia, penninervia, nervis 6–8 supra impressis subtus elevatis, venis transversis subparallelis, utrinque reticulata, reticulo supra quam subtus conspicuiore, petiolis ad 3.5 cm. longis rubescentibus glabrescentibus. Inflorescentia ♂ axillaris et caulina fasciculata, 2–3-umbellata, ad 2.5 cm. longa, minute pubescens, pedunculis pergracilibus ad 1.5 cm. longis. Flores 4–5, ± 3 mm. longi, flavi fide coll., in sicco extus ferrugineo-pubescentes, perianthii lobis 8, glanduloso-punctatis extus pubescentibus, pedicellis brevibus dense ferrugineo-tomentosis. Inflorescentia ♀ et fructus ignoti.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5279 (TYPE ♂, AA), alt. 1250 m., common in limestone forest substage, Oct. 15, 1933 (slender tree 15–20 m. high; flowers yellow).

This species belongs in the group with *L. domarensis* Schmidt, also from New Guinea, but can be separated from it by the smaller leaves (those of *L. domarensis* are $16.5\text{--}34 \times 10\text{--}19$ cm.) with never more than ten pairs of nerves. Also close, if one can rely on the description, is *L. Engleriana* Teschner, which may be separated by the densely tomentose lower surface of leaves which have a tendency to be wider (8–20 cm.). The long and very slender peduncles of *L. mafuluensis*, topped by the bright brown (in

dried state) umbels, and the greyish branchlets, which are reddish and heavily lenticellate at the tips, cause the species to stand apart.

Beilschmiedia Nees

Beilschmiedia Archboldiana, spec. nov.

Arbor 22 m. alta, ramulis glabrescentibus obscure striatis, junioribus plus minusve papillois, fusco-brunnescentibus. Folia alternata vel subopposita, lanceolato-elliptica, 6–11.5 cm. longa, 2–4 cm. lata, subcoriacea, acuminata, basi acuta, saepe paullo obliqua, supra nitida lepidoto-papillosa, subtus glauca, minute pubescentia, glandulosa, penninervia, nervis 10–12 supra obscuris subtus leviter elevatis, costa subtus quam supra elevatiore, utrinque laxe conspicueque reticulata, petiolis 3–9 mm. longis 1–1.5 mm. latis minute papillois griseo-pubescentibus. Inflorescentia axillaris et subterminalis, laxe cymoso-paniculata ad 15 cm. longa, adpresse sericeo-fulvo ferrugineo-pubescentibus, multiflora, pedunculis 2.5–9.5 cm. longis striatis brunneis pubescentibus mox glabrescentibus. Flores 1.7 mm. longi, gemmae flavescentes fide coll., perianthii lobis 6, 1.3 mm. longis, extus adpresse pubescentibus, glanduloso-punctatis, pedicellis ad 0.75 mm. longis. Fructus atratus, papillosus, ellipsoideus, 14–16 mm. longus, 9–11 mm. latus.

NETHERLANDS NEW GUINEA: 2 km. sw. of Bernhard Camp, on the Idenburg River, *Brass & Versteegh 13533* (TYPE, AA), alt. 650 m., occasional tree of primary rain-forest on the slope of a ridge, April 3, 1939 (tree 22 m. high, diameter 48 cm.; crown not widespreading; bark 5 mm. thick, grey, fairly smooth; wood brown; flower buds yellow; fruits black).

The species is outstanding because of the glaucous and pubescent lower surface of the leaves and their loosely reticulate upper surface. The tawny-ferrugineous long pedunculate inflorescence is also a feature of note. The species falls into the same group with *B. Dielsiana* and *B. acutifolia* of Teschner from which it is separated by the reticulate rather than areolate venation. Floral differences also manifest themselves on further study.

Beilschmiedia Brassii, spec. nov.

Arbor 20 m. alta, ramulis glabris, irregulariter sulcatis cicatrisatis griseo-brunneis. Folia alternata, obovata, 7–16 cm. longa, 3.5–8 cm. lata, coriacea, rotundata vel retusa, basi plus minusve rotundata, saepe obliqua, utrinque glabra, supra nitida, pallida, rugosa fide coll., subtus minutissime lepidota interdum minute glandulosa, subinde fusco-villosa, penninervia, nervis 6–8 subtus quam supra elevationibus satis arcuatis, utrinque laxe reticulata, petiolis crassis 1–2 cm. longis griseo-brunneis glabris. Inflorescentia ignota. Infructescentia axillaris, subterminalis, crassa, ad 10 cm. longa, glabra, pedunculis sulcatis. Fructus flavescent, sectus lactescens fide coll., in sicco fuscus, papillosus, subglobosus, 15–17 mm. longus, 12–15 mm. latus, calyce deciduo reliquo subtentus, pedicello crasso 6–7 mm. longo, 3–4 mm. lato irregulariter sulcato glabro.

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass 3930* (TYPE, AA), alt. 500 m., rain-forest, May 2, 1933 (tree 20 m., with dense crown and uneven brittle lenticellate pale brown bark; leaves pale, wrinkled, glossy above; fruit pale yellow, shining, almost globose, $\pm$ 2 cm. diam., exuding a milky sap when cut).

This species, with leaves which are pale shining above and minutely

scurfy with intermittent glands and an occasional black hair below, is unusual indeed. The almost globose pale yellow fruit is a distinguishing feature. It is with no hesitation that I describe it as new, even though no flowers are available.

Beilschmiedea bullata, spec. nov.

Arbor ad 33 m. alta, ramulis glabris tuberculatis, junioribus plus minusve sulcatis, brunneis. Folia alternata, elliptica, obovata, 12–17 cm. longa, 6–10 cm. lata, coriacea, bullata, rotundata vel subacuta, basi acuta, utrinque glabra, junioribus costa venisque lepidoti-pubescentibus, penninervia, nervis 8–10 subtus quam supra prominentius papillois brunneis satis arcuatis, utrinque minute alveolata, petiolis crassis 1–2.5 cm. longis 3–3.5 mm. latis, brunneis glabris papillois. Inflorescentiae ignotae. Infructescentia axillaris, subterminalis, paniculata, ad 12 cm. longa, minute adpresse pubescens plurifructigera. Fructus atro-virens fide coll., in sicco brunneus, glaber, subpapillatus, ellipsoideus, 2–4 cm. longus, 1.2–2.5 cm. latus, calyce deciduo reliquo subtentus, pedicello crasso 5–7 mm. longo 2–4 mm. lato minute adpresse pubescente.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 12528* (AA), alt. 1250 m., common tree of primary forest on a ridge, Feb. 17, 1939 (tree 33 m. high, diameter 82 cm.; crown not widespreading; bark 13 mm. thick, black, rough; wood red; fruits dark green); 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 13112* (TYPE, AA), alt. 850 m., frequent tree of primary rain-forest in the flat plain, March 6, 1939 (tree 29 m. high, diameter 63 cm., the crown not widespreading; bark 14 mm. thick, grey, fairly rough; wood red-brown; fruits green); ? same locality and alt., *Brass & Versteegh 13693* (AA), frequent in somewhat swampy rain-forest of river plains, March 1939 (sparsely branched tree $\pm$ 20 m. high $\times$ 25 cm. diameter; branches myrmecophilous; fruit black).

A species outstanding because of the bullate leaves with prominent venation beneath, the branchlets and costa on the lower surface showing a distinctly papillate condition, and the minute appressed pubescence of the entire inflorescence. There can be hardly a doubt that the smaller-leaved no. 12528 is conspecific with the lush, large-leaved, large-fruited type from a rain-forest of lower altitude. Such a distinctive vegetative character as the occurrence of bullate leaves warrants the species being set up on fruiting material alone. *Brass 13693* has leaves less bullate than those of the type, with a tendency towards bullate leaves, however, on those areas where less pressure was apparently applied while drying. The infructescence is longer (nearly 17 cm.). Also, Brass notes this number as being myrmecophilous, whereas in the other two numbers cited there is no mention made of such a character. There is a tendency, as well, towards larger leaves (up to 20 cm. long $\times$ 16 cm. wide). In other respects no. 13693 is the same as the type.

(*To be concluded*)

JOURNAL

OF THE

ARNOLD ARBORETUM

VOL. XXIII

APRIL, 1942

NUMBER 2

STUDIES IN THE LAURACEAE, IV PRELIMINARY STUDY OF THE PAPUASIAN SPECIES COLLECTED BY THE ARCHBOLD EXPEDITIONS

CAROLINE K. ALLEN

Concluded from page 131

Cryptocarya R. Br.

A word should be inserted at this point about the genus *Cryptocarya*. There are a few affinities of the Papuan species to be found in other islands of the Pacific, in Malaya, etc., but no near relatives. The majority of previously described species from New Guinea were described from flowering material only. It is possible to match the description of only one of these species with the New Guinean material at hand. Only by an examination of the types of Tschner can one be certain of the proper disposition of the material belonging in *Cryptocarya*. Much sterile material has been put aside until such time as it may be compared with the types. Many species have been set apart on fruiting or flowering material only. Oftentimes the fruit of this family is diseased, which fact has further hindered work in this genus. Care has been taken to limit new species only to those which have an outstanding feature or features which could not fail to have come to the attention of previous workers and hence have appeared in their descriptions.

Cryptocarya tetragona, spec. nov.

Arbor, ramulis crassis glabris lenticellatis striatis griseo-rubrescentibus, junioribus adpresse castaneo-pubescentibus, alte sulcatis tetragonis. Folia alternata, elliptica vel lanceolato-elliptica, ad 8–10.5 cm. longa, 2.5–4 cm. lata, coriacea, caudata, cauda $\pm$ 1 cm. longa, basi cuneata, supra glabra, subtus glauca, juniora minute adpresse aureo-brunnescentia triplinervia, nervis majoribus 3–5 mm. supra basim laminae divergentibus supra inconspicuis subtus elevatis, lateralibus 1–2 laminae supra medium, petiolis rubescentibus ad 13 mm. longis, glabris, junioribus griseo-pubescentibus. Inflorescentia axillaris, terminalis, racemoso-paniculata, crassa, brevis, ad 3 cm. longa (post anthesin), adpresse castaneo-pubescentis. Flores 2 mm. longi, extus pubescentes, $\pm$ sessiles. Fructus ater, asymmetricus, depressus,

irregulariter costatus, corollae reliquiis coronatus, 0.9 cm. longus, 1.2 cm. latus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramnang, *Clemens* 5447 (TYPE, AA), alt. 1830 m., Feb. 19, 1937.

The species is very close to *C. cinnamomifolia* F. v. Muell. from Australia, the Australian species having shorter and broader leaves, more tapering toward the longer acumen with the broader portion below the middle, usually glabrous, less castaneous, and with more brownish pubescence when present, the laterals diverging up to 12 mm. from the base, larger flowers (3 mm.) and larger fruit ($\pm$ 12 mm.), subglobose, glaucous, and with the rough surface faintly costate. The branchlets are less coarsely striate, with lenticels not apparent, pale brown in color and glabrous.

***Cryptocarya argyrophylla*, spec. nov.**

Arbor, ramulis gracilis glabris teretibus striatis ad nodos leviter complanatis atro-brunnescentibus. Folia alterna, ovata vel ovato-elliptica, 5–8 cm. longa, 3.5–(4.5) lata, coriacea, anguste caudata, basi rotundata vel acuta, supra glabra, nitida, subtus glabrescentia, juniora supra leviter subtus dense argenteo-lepidoto-pubescentia, triplinervia, nervis prope basim laminae varie divergentibus, supra impressis, subtus elevatis, lateralibus 1–2, petiolis ad 1 cm. longis atro-brunnescentibus glabris vel glabrescentibus. Inflorescentia axillaris vel terminalis, laxe paniculata, ad 8 cm. longa, breviter brunneo-pubescentia. Flores $\pm$ 2 mm. longi, perianthii lobis punctatis. Fructus viridis fide coll., in sicco ater, inaequilateraliter ellipsoideus, apice basique abrupte angustatus, glaber, leviter costatus, 2.5 cm. longus, 1.2 cm. latus, saepe guttatus et papillosus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramnang, *Clemens* 4739 (TYPE, AA), alt. 1830 m., Dec. 23, 1936; Yunzaing, *Clemens* 3566 (AA), alt. 1370 m., July 15, 1936 (forest tree 1.25 m., fruit green).

The smallish, shining, oval, triplinerved leaves, the blackish branchlets, and the widespreading brownish inflorescence make this species stand out from the rest of this group. Possibly *Clemens* 3566 does not belong with it, but, allowing for difference in stage of collection, it seems a fair match. The fruit seems to be unequal due to disease.

***Cryptocarya camptodroma*, spec. nov.**

Arbor parva, virgata, 3–4 m. alta, ramulis maculosis teretibus minute striatis glabrescentibus mox glabris lucidis, flavescenti-brunneis, junioribus fulvo-tomentosis. Folia alternata, oblongo-lanceolata, 10–14 cm. longa, 2.2–3.8 cm. lata, subcoriacea, longe abrupteque caudato-acuminata, basi obtusa vel cuneata, supra glabra nitida, juniora glabrescentia, subtus molli-ter sparse tomentosa, triplinervia, nervis supra basim laminae varie ad 5 mm. divergentibus, lateralibus supra medium 1–2, supra camptodromis impressis subtus elevatis, petiolis ad 1 cm. longis fulvo-tomentosis mox fusco-tomentosis. Inflorescentia ignota. Infructescentia axillaris, brevis, 1–2(?) cm. longa, tomentosa vel glabrescens? Fructus purpureo-ater fide coll., subglobosus vel ellipsoideus, glaber, costatus, late apiculatus, ad 2.2 cm. longus, 1.9 cm. latus, vel 3 cm. longus, 1.7 cm. latus.

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3802 (TYPE, NY), alt. 500 m., common, in dry type of rain-forest on ridge crests, April 20, 1933

(virgate small tree 3–4 m.; the leaves shining above, underneath yellow-green; nerves impressed; ripe fruit purple-black).

Although represented only by a fruiting specimen, placing it unquestionably in the genus *Cryptocarya*, this species is so very distinct and unlike any other known species as to warrant description. The long-caudate subcoriaceous leaves, yellow-green beneath, frequently constricted slightly below the tip, the tawny-tomentose young branchlets and underleaf surface and impressed nerves, and the camptodrome venation apparent above the middle of the leaf combine to make the species outstanding.

***Cryptocarya scalariformis*, spec. nov.**

Arbor parva ad 10 m. alta, ramulis glabris junioribus glabrescentibus minute striatis, junioribus leviter complanatis, pallide flavo-brunnescentibus. Folia alternata vel subopposita, oblonga, 12–18 cm. longa, 5.5–6 cm. lata, pergamentacea, caudato-acuminata, cauda ad 1 cm. longa, basi abrupte cuneata, utrinque glabra, triplinervia, nervis prope basim laminae divergentibus supra inconspicuis subtus elevatis petiolis rubescentibus ad 1.5 cm. longis glabris supra canaliculatis. Inflorescentia axillaris, racemosa(?), gracilis, summo pauciflora, ad 4.5 cm. longa, glabrescens. Flores magni, $\pm$ 6 mm. longi, gilvo-flavescentes, glabri, pedicellis ad 2 mm. longis. Fructus ignotus, ex descriptione 4 cm. longus, 3.4 cm. latus, melo-coloratus.

SOLOMON ISLANDS: Bougainville: Marmaromino, *Kajewski* 2204 (TYPE, AA), alt. 50 m., common in rain-forest, Sept. 30, 1930 (small tree up to 10 m. high; petals cream-yellow, base of buds brown; fruit apple-colored, only one on specimens, length 4 cm., diam. 3.4 cm.; the leaves are the subject of a native superstition that if pieces of the leaves are blown after a ceremony, they cause blindness, usually by an enemy of the person afflicted; common name: "Oo-pu").

The nearest relative is *Cryptocarya pauciflora* Lauterb. & K. Schum. (*Pseudocryptocarya pauciflora* [L. & S.] Teschner, in Engl. Bot. Jahrb. 58: 412. 1923) from Northeastern New Guinea. The latter, however, is a shrub 1–1.5 m. high, with leaves never more than 12 cm. long and a caudate tip of 2 cm. long, whereas *C. scalariformis* is a small tree up to 10 m. high, with leaves never less than 15 cm. long and caudate tip not more than 1 cm. long. The flowers also present differences on detailed examination. Another fairly close affinity is found in *C. cinnamomifolia* Merr. from the Philippines. The wider, somewhat heavier leaves with less evident parallel cross venation immediately separate the two. From Teschner's description and notes on his new genus, I see no reason for maintaining it as separate from *Cryptocarya*. Examination of the type, particularly of the fruit, may show further characters which will warrant a distinct genus.

***Cryptocarya exfoliata*, spec. nov.**

Arbor ad 15 m. alta, trunco alte ramulis leviter sulcatis, leviter et pallide fulvo-pubescentibus, junioribus dense fulvo-pubescentibus. Folia elliptica, 5–12 cm. longa, 2–5.5 cm. lata, chartacea, obtuse caudata vel breviter obtuse acuminata, basi cuneata, interdum obtusa, supra nitida, glabra, juniora pilosa, subtus pilosa, glauca fide coll., plerumque subtriplinervia, nervis lateralibus 3(–6), supra gracillimis, basi leviter elevatis apice evanidis subtus leviter elevatioribus, minute inconspicueque areolata, petio-

lis 6–8(–12) mm. longis, gracilibus supra sulcatis pubescentibus. Inflorescentia ignota. Infructescentia axillaris vel terminalis, ad 7 cm. longa racemoso-paniculata, leviter sulcata vel striata dense adpresse pubescens, ramulis aliquid geniculatis. Fructus ater, ellipsoideus vel subglobosus, glaber, minute papillosus, nitidus, apiculatus, $\pm$ 1 cm. longus, 0.8 cm. latus.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7655 (TYPE, AA), dry type rain-forest fringing lake, Sept. 1936 (tree 15 m. high; bark thin, grey, exfoliating in flaky scales; stem deeply flanged, the flanges extending to the branches and even the branchlets corrugate; underside of leaves glaucous; fruit smooth, black, $\pm$ 1 cm. diam.); Lower Fly River, east bank opposite Sturt Island, *Brass* 8175 (AA), rain-forest of inland dry ridges, Oct. 1936 (low canopy tree 10–12 m.; leaves glaucous underneath; fruit smooth, black).

The species is one of the few from New Guinea which falls into the triplinerviate group, although some individual leaves are penninerved. The leaves are of an unusual dark grey-green color on drying, which, with their glaucous lower surface, causes them to be distinguished immediately. The small shining ellipsoid to subglobose fruit, coupled with the somewhat geniculate closely appressed pubescent floral branchlets, also represent an unusual feature. The flanged trunk and branchlets occur in other species, but not in the triplinerved group. The Lower Fly River specimen bears leaves which are obscurely triplinerved. Close examination, however, shows leaves on the same branchlet exhibiting that condition.

Cryptocarya idenburgensis, spec. nov.

Arbor ad 29 m. alta, ramulis glabrescentibus teretibus striatis, atrobrunnescentibus, junioribus angulatis, griseis sparse pubescentibus. Folia alternata, lanceolato-elliptica vel elliptica, 8–15 cm. longa, 2.7–5 cm. lata, percoriacea, attenuate acuminata, basi subrotundata, saepe inaequalia, supra sparse minute glabrescentia, subtus minute dense adpresse griseo-pubescentia, ut videtur glauca, triplinervia, nervis prope basim laminae varie divergentibus, lateralibus 2 supra medium, supra impressis subtus elevatis, petiolis crassis ad 2 cm. longis sparse minute griseo-pubescentibus canaliculatis. Inflorescentia immatura, axillaris vel terminalis, ad 6 cm. longa, densiflora, patenti-paniculata, dense adpresse sericeo-ferrugineo-pubescentia. Flores magni $\pm$ 4 mm. longi, extus pubescentes, perianthii tubo intus pubescente. Fructus ignotus.

NETHERLANDS NEW GUINEA: 15 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh* 11912 (TYPE, AA), alt. 1740 m., occasional on the slopes in rain-forest, Jan. 11, 1939 (tree 29 m. high, diameter 47 cm.; crown not widespreading; bark 8 mm. thick, brown, fairly smooth; wood brown; flowers brown, not yet open).

A striking species because of the very coriaceous triplinerviate leaves, which are glaucous beneath, and the bright ferrugineous-pubescent dense-flowered inflorescence. The nearest species is *C. tetragona*, which is represented by a specimen in a later stage of development. In the latter there is apparently, as far as can be judged from the post-anthesis inflorescence, the same ferrugineous pubescence. Generally speaking, the leaves of the latter are of the same type, but differ in size, shape, pubescence and the length of petiole, those of *C. idenburgensis* being up to 15 cm. long, usually lanceolate-elliptic with long attenuate-acuminate tips, densely appressed greyish pubescent beneath, and petioles up to 2 cm. long. Possibly inter-

mediate specimens may eventually be collected that will make it expedient to include the two in a single species.

***Cryptocarya globosa*, spec. nov.**

Arbor ad 20 m. alta, ramulis breviter ferrugineo-tomentosis mox glabris teretibus. Folia alternata, oblonga, 17–26 cm. longa, 7–8 cm. lata, chartacea, breviter apiculata vel leviter apiculato-acuminata, basi acuta inaequalia, utrinque costa glabrescente excepta glabra, in sicco subtus rube-scente, minute glanduloso-punctata, penninervia, nervis 10–12 supra impressis subtus elevatis, costa subtus pallide brunnea fide coll., reticulata, petiolis aliquid crassis, ad 1.5 cm. longis, breviter adpresse ferrugineo-tomentosis mox glabris. Inflorescentia ignota. Infructescentia axillaris, aliquando ramosa crassa, brevis ad 6 cm. longa, utrinque glabra. Fructus ater, glaber, laevis, in sicco leviter brunneo-guttatus, saepe rimosus, globosus, saepe basi abrupte attenuatus (subturbatus), obtuse apiculatus, 3.4×3 cm. fide coll., $\pm$ sessilis.

SOLOMON ISLANDS: Bougainville: Kugumaru, Buin, *Kajewski 1784* (TYPE, AA), alt. 150 m., common in rain-forest, May 28, 1930 (medium-sized tree up to 20 m. high; midrib light brown beneath; fruit black when ripe, in length 3.4 cm., in diameter 3 cm., with small protuberance at end; common name: "Tin-dinni").

Another species so distinctive that, although only fruiting material is available, a description is inevitable. The typical fruit places it without question in *Cryptocarya*, despite the presence of thin chartaceous leaves unusual for the genus. From the description of *C. depressa* Warb., one might be inclined to claim relationship here for the new species. Warburg 20574 from the Bismarck Archipelago, presumably the type of the former, is at variance with Warburg's description. The leaves are less than 15×5 –6 cm., and are pubescent below, whereas Warburg notes leaves 18 – 22×7 –10 cm. and glabrous. Warburg states in his description that underneath the tree he found flowers of a *Cylicodaphne* but was not sure that they belonged to his specimen. The fruit of no. 20574 is obviously of a *Cryptocarya*. K. Schumann & Lauterbach (Fl. Deutsch. Schutzgeb. Südsee 333. 1901) remark, in connection with *C. depressa*, that many specimens of bark and leaves of *Massoia* come in, (an aromatic lauraceous plant which is probably a species of *Cinnamomum* and which Schewe l.c. has placed under *Cinnamomum*), but no flowers or fruit. Apparently the authors feel that there is perhaps some connection here with Warburg's species. *Cryptocarya globosa* is in all probability aromatic also, if one may judge by the presence of countless minute punctate glands that are visible on the leaves under a lens. It is impossible to clear up the situation without access to the specimen from which Warburg drew his inadequate diagnosis. Meanwhile *C. globosa* is mentioned as a possible relative.

***Cryptocarya Brassii*, spec. nov.**

Arbor 12–14 m. alta, cortice brunneo in squamis parvis mollibus exfoliato, fide coll., ramulis minute pubescentibus mox glabrescentibus, griseo-brunnescentibus. Folia alternata, oblonga, ad 26 cm. longa, ad 10 cm. lata, coriacea, apice basique breviter obtuse acuminata, supra glabra, nitida, subtus sparse pilosa, penninervia, nervis ± 17 , supra impressis subtus elevatis

minute pubescentibus, costa supra impressa subtus crassa elevata minute pubescente mox glabrescente, crasse conspicueque reticulata, petiolis crassis ad 2 cm. longis, 3 mm. latis rugosis glabrescentibus. Inflorescentia ignota. Infructescentia terminalis, late-paniculata, crassa, ad 15 cm. longa lataque, ramulis utrinque pubescentibus subangulatis. Fructus ater, apice basique pallide minute pubescens, paullo turbinatus, apiculatus, obscure costatus, ad 1.5 cm. longus, ad 8 mm. latus, $\pm$ sessiles.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7516 (TYPE, AA), common in rain-forest substage, Aug. 1936 (tree 12–14 m. high; bark close, brown, exfoliating in small soft scales; fruit black), possibly also *Brass* 7499 (AA), same locality, common tree in rain-forest canopy layer, Aug. 1936 (leaves stiff, the underside brown pubescent; fruit black $\pm$ 1 cm. long); Koitaki, *Carr* 12693 (NY), alt. 450 m., forest, June 25, 1935 (tree 15 m. tall; buds brown), same locality, *Carr* 12740 (NY), June 27, 1935 (leaves brown hairy beneath; young fruit green).

It is probable that the Carr specimens in flower and young fruit may represent early stages of *C. Brassii*. The two Brass collections cited I feel strongly to be the same, but they are in different stages of development and growing under slightly different conditions. More complete material will aid in solving the difficulty.

***Cryptocarya cordata*, spec. nov.**

Arbor magna, ramulis dense pallide ferrugineo-tomentosis obscure striatis. Folia subopposita oblonga, 8.5–31 cm. longa, 2.5–10 cm. lata, subcoriacea, longe mucronata, basi cordata, supra costa pubescente excepta glabra, nitida fide coll., subtus molliter pubescentia, penninervia, nervis 10–20, supra impressis subtus elevatis pallide ferrugineo-tomentosis ad marginem divergentibus, costa supra pubescente subtus elevata pallide ferrugineo-tomentosa, venis transversis parallelis, minute reticulata, petiolis crassis ad 0.5 cm. longis dense pallide ferrugineo-tomentosis. Inflorescentia ignota. Infructescentia axillaris, paniculata, crassa, ad 8 cm. longa, utrinque breviter pallide ferrugineo-tomentosa. Fructus ater, glaber, paullo turbinatus, obtuse apiculatus, ut videtur costatus, ad 1.7×0.9 cm., $\pm$ sessiles.

NEW BRITAIN: Gazelle Peninsula, Nodup area, *Waterhouse* 324, *Fale Ser.* No. 28621, (TYPE, NY), Sept.-Oct. 1934 (large tree; leaf glossy, underside "soft"; fruit black, about size of currant, used as a relish with certain foods; Teop. name: "nubiri"; "Tukura").

SOLOMON ISLANDS: Bougainville: Marmaromino, *Kajewski* 2213 (AA), alt. 50 m., common in rain-forest, Sept. 30, 1930 (medium-sized tree up to 20 meters high, the young stems covered with short brown hair, leaves with prominent brown veins underneath; fruit black, in length 8 mm; the leaves are heated and applied to sore eyes by natives; common name: "Tembu").

The species appears to be most closely related to the New Guinean species *C. multipaniculata* Teschner, from Kaiser-Wilhelmsland at an altitude of 600 m. The latter species, however, is noted as a small, myrmecophilous tree with acute or shortly acuminate leaves up to 19 cm. long, in which the lateral nerves are confluent near the margin. *Cryptocarya cordata* is a large tree with long-mucronate leaves up to 31 cm. long, in which the lateral nerves go to the very margin. The specimen cited from the Solomon Islands belongs here probably, although the majority of the leaves are broadly elliptic and much shorter than those of the type. At

most, the differences might be the means of designating a variety from that locality. Although there is only a single fruiting specimen represented, the tree is distinctive enough to warrant description.

***Cryptocarya umbonata*, spec. nov.**

Arbor parva ad 15 m. alta, ramulis gracilibus glabris striatis rubescentibus. Folia alternata, lanceolata, 8–13 cm. longa, 2–3.5 cm. lata, chartacea, attenuato-acuta vel acuminata, basi acuta, utrinque glabra, penninervia, nervis 6–9, supra quam subtus obscurioribus, utrinque reticulata, petiolis gracilibus 7–8 mm. longis, glabris rubescentibus. Inflorescentia ignota. Infructescentia axillaris(?), crassa, ad 3–4 cm. longa, glabra. Fructus ater, depresso-globosus, glaber, apice umbonatus, corollae reliquiis coronatus, 2.5 cm. longus, ad 3 cm. latus, pedicello incrassato glabro dense brunnescenti-lenticellato.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski 1695* (TYPE, AA), alt. 1000 m., common in rain-forest, April 12, 1930 (small tree up to 15 m. high; fruit length 2.5 cm., diameter 3 cm., much more broad than long, full grown on specimens, red when cut).

Few species of the genus have lanceolate, thin, papery leaves with fruit that is broader than long and borne on short branchlets. The umbonate tip of the fruit is an unusual feature as well. The flowers of the species should prove interesting to keep pace with the other characters. This is the first instance where the collector has mentioned that the inside flesh of the fruit is red when cut. The fact that the fruiting pedicel is enlarged is normal for the family but the superabundance of what appear to be numerous brownish lenticels completely obscuring the natural color of the branchlets might indicate disease of this part. There seems scarcely any doubt of the genus, certainly not of the family.

***Cryptocarya brevipes*, spec. nov.**

Arbor, ramulis tomentosis mox glabrescentibus, striatis. Folia elliptica vel ovata, raro inaequalia, ad 15 cm. longa, 6–7.5 cm. lata, coriacea, caudato-acuminata vel leviter acuminata, basi rotundata vel acuta, supra glabra subtus pilosa, minute glanduloso-punctata, penninervia, nervis 9–12 supra impressis leviter pubescentibus subtus elevatis dense ferrugineo-tomentosis, venulis sparsis, non reticulata, petiolis crassiusculis ad 1.1 cm. longis, tomentosis. Inflorescentia immatura, ferrugineo-tomentosa. Infructescentia axillaris, brevissima, crassa, ut videtur fructu singulo maturante, 0.7–2.5 cm. longa ferrugineo-tomentosa. Fructus rubescens subglobosus, glabrescens, mox glaber apice basique longe ferrugineo-pubescentibus, circiter 1.3 cm. diam., apice basique apiculatus, pedunculo $\pm$ 2 mm. longo crasso tomentoso.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens 3451* (TYPE, AA), alt. 1825 m., June 29, 1936; Ogeramnang, *Clemens 5424* (AA), alt. 1830 m., forest hill, Feb. 17, 1937 (tall tree, dbh. 0.30–0.90 m., buds green).

The species is based on material so fragmentary that at first glance it seems useless to attempt a description. The unusually short infructescence, single-fruited at maturity, though showing that one or two other lateral fruits have fallen off earlier in the development of the fruiting branchlet, is an unusual character. The roundish fruit, fairly sharp-pointed at both

ends, with tufts of long rusty hairs, is also unique. Unfortunately, all except two leaves are cut off or broken at the tips, but the two remaining are very different and probably cover the range of variation that might be apparent in the others. No field notes accompany the specimens other than those given under the citation.

***Cryptocarya palmerensis*, spec. nov.**

Arbor procera gracilis, ramulis glabris striatis lenticellatis, atro-rubescens. Folia ovata vel elliptica, 7.5–12 cm. longa, 3–5.5 cm. lata, coriacea, obtusa vel obtuse acuminata, falcata, basi rotundata vel acuta, supra glabra, subtus glauca fide coll., penninervia, nervis 3–4 supra impressis subtus elevatis atro-rubescens leviter glabrescentibus, subconspicue reticulata, petiolis gracilibus ad 2 cm. longis glabris atro-rubescens, junioribus supra minute papillosis. Inflorescentia axillaris gracilis laxa paniculata, ad 5 cm. longa pallide adpresse ferrugineo-pubescentis, pauciflora, pedunculis ad 5 mm. longis. Flores ultimi 2–3, ad 2–3 mm. longi, extus intusque pubescentes, staminibus et staminodiis pubescentibus. Infructescentia axillaris, paniculata, ad 12 cm. longa, utrinque glabra, ramulis nitidis geniculatis. Fructus ater, glaucus, ellipsoideus, apice basique attenuatus, 2.5 cm. longus, 1.5 cm. latus, apice floris reliquiis coronatus, pedunculo breve.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction of Black River, *Brass* 6868 (TYPE, fruit AA), alt. 100 m., riverine forest canopy, June 1936 (tall slender tree with spurred base, brown lenticellate bark, and brown wood; leaves glaucous below; immature fruit glaucous); 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13127 (AA), alt. 850 m., frequent tree of primary rain-forest in the flat plain, March 9, 1939 (tree 29 m. high; diameter 54 cm.; crown not widespreading; bark 8 mm. thick, grey; wood orange-red; fruit green).

Under *Cryptocarya palmerensis* may be placed the following: Eil. Bak. Soroëi, Netherlands Indies Forest Service *bb* 30925 (fl., AA), alt. 50 m., Sept. 28, 1939; 30915, 30918.

The localities of the two Brass specimens cited are separated by high mountain ranges and the altitudes differ by 750 meters. With so many points in common, however, it must become evident that there is close affinity between them. It remains to be seen whether or not an abundance of material will reveal a series of intergrading specimens, localities and altitudes which will justify two entities being considered as belonging to the same species.

***Cryptocarya sulcata*, spec. nov.**

Arbor, ramulis glabris sulcatis dense lenticellatis, griseis vel rubescentibus. Folia oblonga, 9.5–16 cm. longa, 5–8 cm. lata, coriacea, apice basique rotundata, vel retusa basi abrupte acuminata, margine revoluta, leviter undulata, utrinque glabra nitida? penninervia, nervis 9–12, supra impressis, subtus elevatis, costa leviter papillosa, pallide rubescente, venulis transversis supra inconspicuis subparallelis, subtus reticulata, petiolis crassis ad 2 cm. longis ad 4 mm. diam., nigrescentibus glabris, adultioribus lenticellatis. Inflorescentia axillaris et terminalis paniculata, ad 12 cm. longa, multiflora, minute dense puberula, pedunculis ad 4 cm. longis glabrescentibus sulcatis minute papillosis, ramulis striatis ad nodos leviter complanatis. Flores circiter 3 mm. longi, extus pubescentes, brevipedicellati. Fructus

(no. 1769) immaturus?, viridis fide coll., in sicco atro-rubescens, ellipsoideus, glaber, leviter maculatus, apice floris reliquiis coronatus, basi attenuatus.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 3450 (TYPE, AA), alt. 1525 m., June 29, 1936; Ogeramnang, *Clemens* 4827 (AA), alt. 1795 m., Jan. 1, 1937; Yunzaing, *Clemens* 3435 (AA), alt. 1525 m., June 26, 1936; Wareo, *Clemens* 1769 (AA), alt. 750 m., high forest, Feb. 4, 1936 (tree dbh. 26 cm.; leaves pale below; flower dull yellow; fruit 1-seeded, green).

Many species from New Guinea have more or less sulcate branchlets, but those of these species are sulcate to a greater degree than most. This, with the numerous prominent lenticels, indicates a new species. There can be no doubt that the first three numbers are conspecific. The fruit, apparently, is diseased, although it is possible to note that it is ellipsoid, and maculose in the manner of *C. Mackinnoniana* F. v. Muell. or *C. Whiteana* Allen. Vegetatively it has some points of resemblance with *C. Brassii* Allen. The presence of numerous lenticels shows a similarity to *C. verrucosa* Teschner but it lacks the acuminate leaves, lanuginose below, among other differences. *Clemens* 1769 is in a younger stage, but there is present the same sulcate and lenticellate condition of the branchlets. The leaves are perhaps less coriaceous, with a more definite apex and thirteen pairs of lateral nerves. The inflorescence is shorter but similar to the more developed inflorescences of the other numbers. The fruit is borne on much thickened pedicels, striate and verrucose, the fruiting branchlets are sulcate, becoming striate toward the tips. The apex of the fruit has a prominent crown about 2 mm. across, consisting of the remains of the flower.

***Cryptocarya pergamentacea*, spec. nov.**

Arbor 15 m. alta, ramulis gracilibus glabris nitidis striatis ad nodos leviter complanatis rubescentibus. Folia alternata, lanceolata vel lanceolato-elliptica, 9–12.5 cm. longa, 2.5–6 cm. lata, pergamentacea, longe caudato-acuminata, saepe falcata, cauda 1–1.8 cm. longa, basi acuta vel leviter attenuata, utrinque glabra, in sicco subtus pallida, penninervia, nervis pubescentibus pallidis, fide coll., 5–6 in axillis superioribus domatiis parvis insignitis in sicco supra obscuris subtus elevatis rubescentibus, subtus quam supra conspicuius minute reticulata, petiolis gracilibus, ad 1.5 cm. longis glabris rubescentibus. Inflorescentia terminalis et axillaris, laxe paniculata, gracilis ad 12 cm. longa, multiflora, glabra, summa glabrescente, pedunculis longis. Flores $\pm$ 2.3 mm. longi, gilvi fide coll., perianthii lobis extus pubescentibus, brevipedicellatis vel sessilibus. Fructus ignotus.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8012 (TYPE, AA), substage tree in flood plain rain-forest, Oct. 1936 (tree 15 m. high; leaf nerves pale; flowers cream-coloured).

The species is unique because of the parchment-like, often falcate, drip-tip leaves. The presence of domatia or glands in the axils of the lower pairs of lateral nerves on the lower surface of the leaves is unusual for the genus. The glands are not visible from the upper surface of the dried specimens but show up below due to the small tuft of hairs sprouting from the axils. *Cryptocarya foveolata* White & Francis from Australia has glands, but in this species the leaves are three-nerved and the glands are very prominent

above and below, as in the widespread *Cinnamomum Camphora* (L.) Nees & Eberm. from the Orient. The long, graceful, rather spreading, many-flowered inflorescence is also a distinguishing feature of *C. pergamentacea*.

***Cryptocarya subfalcata*, spec. nov.**

Arbor parva, ramulis gracilibus glabris striatis teretibus griseis, junioribus rubescentibus. Folia elliptica vel lanceolato-elliptica, 6–12 cm., raro 13 cm. longa, 2–3.5 cm., raro 4.5 cm. lata, chartacea, apice caudata, cauda $\pm$ 1 cm. longa, subfalcata basi obtusa, utrinque glabra, penninervia, nervis 4–5 supra obscuris subtus elevatis, costa supra impressa subtus elevata, utrinque reticulata, petiolis gracilibus 5–7 cm. longis glabris canaliculatis. Inflorescentia axillaris, paniculata, gracilis, ad 3 cm. longa, glabrescens. Flores parvi, 1.6 mm. longi, ochracei fide coll., extus glabrescentes pedicellis brevibus pubescentibus. Fructus immaturus(?).

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 3907 (TYPE, AA), alt. 1370 m., forest hills, Aug. 18, 1936 (small tree, dbh. 7.5–10 cm.; flower khaki-yellow); *Clemens* 3772 (AA), alt. 1370 m., forest trail, Aug. 6, 1936 (tree height variable, dbh. 10 cm. to big tree; fruit green to very dark).

The slender, greyish, terete branchlets, the small glabrous leaves, and the slender short inflorescence with small flowers mark this species as differing from all others. The fruit of the type specimen is small (5 mm. diam.) and subglobular. It is probably in very young stage, and appears to have been attacked by insects or in some way diseased. *Number* 3772 shows obconic fruit, 8 mm. long, 10 mm. wide. The structure, as well as the texture of these fruits, appears abnormal even in the dried state. Although the leaves are slightly longer on the whole than those of the type specimen, they are probably conspecific.

***Cryptocarya aureobrunnea*, spec. nov.**

Arbor parva, ramulis glabrescentibus plus minusve glandulosis, junioribus pubescentibus, teretibus, striatis brunnescentibus. Folia elliptica, 6.5–14 cm. longa, 4.5–7.5 cm. lata, subcoriacea, rotundata vel leviter obtuse acuminata, basi subrotundata vel obtusa, supra glabra, subtus glabrescentia deinde glabra, penninervia, nervis 5–7 supra inconspicuis subtus elevatis, costa supra impressa plus minusve papillosa, subtus elevata, subtus graciliter reticulata, petiolis 1–1.2 cm. longis, glabrescentibus, papillosis brunnescentibus. Inflorescentia axillaris, pluripaniculata, plerumque ramosa, ad 15 cm. longa, adpresse aureo-brunneo-subsericeo-pubescentis, ramulis papillosis, angulatis. Flores minute ferrugineo-pubescentes, ad 2.5 mm. longi. Fructus ignotus.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 14072 (TYPE, AA), alt. 50 m., flooded rain-forest of river plains, April 1939 (tree 15 m. high).

The numerous, slender, many-panicked, golden brown axillary inflorescences, almost silky appressed pubescent with minute flowers, is sufficient grounds for denoting this species as new. The glandular condition prominent on the branchlets of the inflorescence and less so on the stems proper is another mark of distinction. Near this, or perhaps even belonging to it, are the following Clemens numbers, the branchlets of which apparently have been attacked by a fungus: NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 1824 (AA), alt. 990 m., hill forest, Feb. 13, 1936 (small

tree, dbh. 10–15 cm.; leaves pale beneath; flower buds golden brown); same locality, *Clemens 1887* (AA), Feb. 19, 1936.

***Cryptocarya Whiteana*, spec. nov.**

Arbor 15 m. alta, ramulis griseo-fuscis glabrescentibus, junioribus dense ferrugineo-tomentosis. Folia alternata, oblonga vel elliptica, juniora subrotundata, 3–10 cm. longa, 2–4.5 cm. lata, per coriacea, subbullata, rotundata vel retusa, basi obtusa rotundata vel subauriculata, margine saepe revoluta, supra costa nervisque exceptis glabra, junioribus utrinque pubescentibus, nitida, subtus subglauca, pubescentia, penninervia, nervis 5–9 utrinque ferrugineo- vel pallide ferrugineo-tomentosis supra impressis subtus elevatis venis transversis parallelis utrinque conspicuis, supra inconspicue minuteque areolata, petiolis crassis ad 1 cm. longis dense ferrugineo-tomentosis mox fusco-glabrescentibus. Inflorescentia ignota. Infructescentia axillaris, paniculata, crassa, ad 10 cm. longa, fusco-glabrescens. Fructus purpurascens, in sicco albo-guttatus, glaber, late ellipticus, late apiculatus, scaber, 2×1.5 cm., $\pm$ sessilis.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass 5003* (TYPE, NY), alt. 2400 m., common in damp valley forests, Sept. 11, 1933 (tree 15 m. or more high, with dense irregular crown of very stiff concave leaves and an abundance of hard purplish fruit; flowers not seen).

In determining this number in 1936, Mr. C. T. White, Government Botanist of Queensland, made the following note: "This is very like *C. Mackinnoniana* of North Queensland, but the Papuan species has a much broader fruit and is probably another, but closely allied, species." His comment on the fruit is correct and other differences in pubescence and leaf characters are evident as well. It is a pleasure to name it in honor of Mr. White, who has done much to further our knowledge of Australasian and Papuan flora.

***Cryptocarya Archboldiana*, spec. nov.**

Arbor 25 m. alta, ramulis glabris sulcato-angulatis ad nodos leviter complanatis atro-rubrescentibus. Folia alternata, ovata vel ovato-elliptica, 6.5–11 cm. longa, 3–5.5 cm. lata, coriacea, breviter caudato-acuminata basi rotundata, obtusa vel raro acuta, supra glabra, subtus minute sparse breviter pubescentia, penninervia, nervis 3, raro 4, supra inconspicuis subtus elevatis, petiolis gracilioribus, 1–1.5 cm. longis, glabrescentibus atro-rubrescentibus, plus minusve papillosis. Inflorescentia terminalis et axillaris, erecte paniculata, ad 8 cm. longa, pubescens, infima glabra, pedunculis ad 3 cm. longis, plus minusve papillosis. Flores ad 3.3 mm. longi, flavi fide coll., perianthii lobis extus intusque pubescentibus brevipedicellatis. Fructus viridis, fide coll., glaber, ellipsoideus, obscure costatus vel rugosus, obscure papillosus.

NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteeg 14110* (TYPE, AA), alt. 75 m., on lower mountain slopes of primary rain-forest, May 3, 1939 (tree 25 m. high, diameter 43 cm.; crown not widespreading; bark 10 mm. thick, brown; wood brown; flowers yellow); same locality, *Brass & Versteeg 13119*, (AA), alt. 850 m., occasional tree of primary rain-forest in the flat plain, March 7, 1939 (tree 25 m. high, diameter 46 cm.; crown not widespreading; bark 6 mm. thick, black; wood brown; fruits green).

The last-mentioned specimen is from a branch in a younger stage of de-

velopment, bearing mature fruits, which apparently are left from the crop of the previous season. The lower leaves are more coriaceous, while the new growth, continuing through last year's inflorescence, shows young leaves in the process of unfolding. Despite the difference in age of the two branchlets, it is apparent that the specimens are conspecific. One of the most distinct features is the sturdy terminal inflorescence with papillose surface and angled or even sulcate branchlets. The sericeous, silvery or golden, appressed pubescence on the lower surface of the young leaves has rarely been noted in the genus.

***Cryptocarya bernhardiensis*, spec. nov.**

Arbor 10–12 m. alta, ramulis gracilibus glabris, junioribus pubescentibus, griseis. Folia elliptica, raro elliptico-ovata, 6–8.5–10 cm. longa, 2–4 cm. lata, chartacea, caudata, cauda $\pm$ 1 cm. longa, basi subrotundata vel obtusa, matura supra glabra, juniora pilosa, subtus glauca, longe pubescentia, penninervia, nervis 4–6, supra obscuris impressis plus minusve pubescentibus subtus elevatis pallide brunnescentibus, subtus reticulata, petiolis gracilibus ad 8 mm. longis minute denseque pubescentibus. Inflorescentia ignota. Infructescentia axillaris, gracilis, ad 4 cm. longa, pubescens. Fructus ater, subglobosus, ut videtur bipartitus, glaber, minute papillosus, apice corollae cicatrice coronatus, 1 cm. longus, 1.5 cm. latus.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, *Brass 12968* (TYPE, AA), alt. 1200 m., rain-forest substage tree, Feb. 1939 (tree 10 m. high; underside of leaves glaucous; fruit black); 4 km. sw. of Bernhard Camp, Idenburg River, *Brass 13467* (AA), alt. 850 m., rain-forest of river plains, March 1939 (slender substage tree 12 m. high).

The species is unusual for its fruit, which is wider than long, obscurely channeled along its longitudinal circumference, giving the appearance of a bipartite condition. This type of fruit is found in *Cryptocarya corrugata* White & Francis from Queensland, but resemblance to that species ends there.

***Cryptocarya Kajewskii*, spec. nov.**

Arbor ad 25 m. alta, ramulis glabris, junioribus minute pubescentibus, striatis lenticellatis, atro-rubrescentibus. Folia alternata, ovata vel ovato-elliptica, saepe obliqua, 6–9 cm. longa, 2–4.5 cm. lata, subcoriacea, acuta vel attenuate acuta, minute mucronulata, basi rotundata vel abrupte acuminata, saepe inaequalia, raro acuta, supra glabra, nitida, in sicco rubro-brunnescentia, subtus minute sparse pilosa, argentea, fide coll., penninervia, nervis 3–4(–5) supra impressis inconspicuis subtus elevatis, utrinque reticulata, petiolis gracilibus, ad 1 cm. longis minute pubescentibus. Inflorescentia immatura, terminalis et axillaris, paniculata, ad 4 cm. longa, minute adpresse pubescens. Flores $\pm$ 2 mm. longi, perianthii lobis crassis, extus pubescentibus. Fructus ignotus.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski 1676* (TYPE, AA), alt. 950 m., common in rain-forest, April 10, 1930 (medium- to large-sized tree up to 25 m. high; leaves silvery beneath, the young leaves pink green; flowers buds only on specimen).

This is a very striking species because of the dark reddish brown ovate leaves. It resembles no known Papuan species, but certainly belongs to

Cryptocarya. There is no suggestion of a silvery or glaucous under-leaf surface on the dried specimen. On the branchlets of the immature inflorescences an approach to a papillate condition is noticeable.

***Cryptocarya Ledermannii* Teschner in Engl. Bot. Jahrb. 58: 408. 1932.**

NETHERLANDS NEW GUINEA: 18 km. sw. of Bernhard Camp, Idenburg River, *Brass* 12677 (AA), alt. 2150 m., frequent in substage layer of mossy forest, Feb. 1939 (tree attaining 10 m.; underside of leaves glaucous; flowers green; fruit unripe); same locality, *Brass & Versteegh* 12530 (AA), alt. 1230 m., occasional tree on slope of ridge of primary forest, Feb. 17, 1939 (tree 28 m. high, diameter 53 cm.; crown not wide-spreading; bark 12 mm. thick, black, fairly rough; wood brown; fruits red-brown).

Brass 12677 shows young leaves densely woolly ferrugineous-tomentose on both surfaces. The rusty color of the pubescence apparently becomes dark fuscous as the season advances, for older leaves and branchlets have no trace of brightness. Indeed, the tomentum itself wears off as the branchlets lengthen. The young inflorescence is also densely woolly ferrugineous-tomentose and the flowers are noted as green, as opposed to the yellow of Teschner's description. On this specimen is a single fruit which *Brass* indicates as unripe. Number 12530 is an older branchlet, with longer internodes and slightly larger leaves, and is less tomentose throughout. No glaucous condition of the leaves is noted, but that, if present on younger leaves, may be evanescent with age. The few fruits left on the branchlets are apparently immature, even though the collectors have stated that they are red-brown.

***Cryptocarya perlucida*, spec. nov.**

Arbor, ramulis rigidis glabris, junioribus rigide atro-pubescentibus, atro-rubrescentibus. Folia elliptica vel elliptico-ovata, ad 7 cm. longa, 2–3 cm. lata, coriacea, caudato-acuminata, cauda $\pm$ 1 cm. longa, basi acuta leviter subaequalia, utrinque glabra, in sicco castanea, supra lucida, penninervia, nervis 4–5 supra impressis subtus elevatis, subtus obscure reticulata, petiolis ad 1 cm. longis atro-rubrescentibus, glabris vel glabrescentibus. Inflorescentia axillaris et subterminalis, paniculata, ad 5 cm. longa, fulvo-pubescent. Flores 2–3 mm. longi, ochracei, fide coll., extus pubescentes $\pm$ sessiles. Fructus immaturus (?).

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 4076 (TYPE, AA), alt. 1525 m., forest hill, Sept. 3, 1936 (tree 0.3–5.5 m. diam.; flower dull khaki; fruit dark olive); Yoangen-Yunzaing, *Clemens* 3351 (AA), alt. 1220–1525 m., June 18, 1936; Ogeramnang, *Clemens* 5397 (AA), alt. 1830 m., Feb. 15, 1937.

Numbers 3351 and 5397 have leaves slightly larger (9 cm. long) than those of the type, and somewhat glaucous below. The branchlets of 5397 seem slightly less coarse and lack the remnants of the spreading black pubescence found on the type; also the leaves appear to be less shining. The fruit of the type is either immature or diseased. The combination of castaneous glabrous caudate leaves, fulvous inflorescence, and stiff reddish black branchlets set this species apart from the others. It seems to be most closely related to *C. Schlechteri* Teschner from Kaiser-Wilhelmsland, but may be distinguished by narrower caudate acuminate leaves, and minutely pubescent panicles.

***Cryptocarya minutifolia*, spec. nov.**

Arbor 14–16 m. alta, ramulis glabris, junioribus minute verrucosis, fusco-brunneis. Folia alternata, late elliptica vel subrotundata, ad 2 cm. longa, 1.4 cm. lata, coriacea, rigida, rotundata, saepe retusa, basi acuta vel attenuate acuta, utrinque glabra, supra nitida, subtus glauca, fide coll., margine revoluta, penninervia, nervis 3–4 supra inconspicuis subtus elevatis costa supra impressa subtus elevata, supra levis subtus minute reticulata, petiolis ad 4 mm. longis gracilibus nigrescentibus glabris. Inflorescentia ignota. Infructescentia, ut videtur, terminalis, erecte paniculata, crassa, ad 6(–8) cm. longa, utrinque glabra, pedunculis nigrescentibus minute verrucosis. Fructus ater, glaber, nitidus, subglobosus vel subturbinatus, apiculatus, rugosus et subcostatus fide coll., ad 1.4 cm. diam. $\pm$ sessilis.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, *Brass* 4741 (TYPE, NY), alt. 2840 m., one of the principal species in range top forests, Aug. 7, 1933 (large clear-trunked wide-crowned tree 14–16 m. tall; leaves stiff; upperside shining; lower glaucous; margins recurved; fruit shining black, wrinkled and somewhat costate, 1.2–1.4 cm. diam.).

Although only a single specimen is available, and that in fruit, there can be no doubt of its status as a new species. Nowhere in the genus are found such small leaves. The costate fruit crowned with the remains of the floral parts place it unquestionably in *Cryptocarya*. The length of the inflorescence and its position are difficult to determine in the fruiting specimen because many times the leaves fall as the infructescence develops, making the panicle appear terminal.

Endiandra R. Br.

Endiandra grandifolia Teschner in Engl. Bot Jahrb. **58**: 417. 1923.

NORTHEASTERN NEW GUINEA: Morobe District, Quembung Mission, *Clemens* 2110 (AA), alt. 600 m., margin forest mission house, March 23, 1936 (tree 19.5–21 m. flower brown; fruit green); Wareo, *Clemens* 1600 (AA), alt. 600 m., Jan. 8, 1936.

The leaves of the above numbers are obtuse or very shortly acuminate at the apex, less obtuse than acutish at the base, and the anthers are introrse. Otherwise the specimens are a match for the description of Teschner's *E. grandifolia*.

***Endiandra Brassii*, spec. nov.**

Arbor ad 27 m. alta, ramulis glabris striatis atro-rubrescentibus. Folia alternata, elliptica vel oblongo-elliptica, 13–21 cm. longa, 6–10 cm. lata, glabra, subcoriacea, obtusa vel breviter obtuse acuminata, basi acuta vel leviter attenuata, saepe leviter inaequale, supra nitida, penninervia, nervis 8–10 supra subinconspicuis, subtus leviter elevatis, costa atro-rubescens supra leviter impressa subtus elevata, utrinque conspicue reticulata, petiolis crassis canaliculatis ad 2.2 cm. longis atro-rubrescentibus glabris. Inflorescentia subterminalis, longe paniculata, ad 16 cm. longa, glabrescens, multiflora, pedunculis ad 4.5 cm. longis crassiusculus. Flores $\pm$ 2 mm. longi, flavo-viridescens, pubescentes mox glabrescentes, pedicellis $\pm$ 1 mm. longis glabrescentibus. Fructus fusco-viridescens, glaber inaequilateraliter obovoideus, basi attenuatus, stipitatus, in toto ad 8 cm. longus, (stipe $\pm$ 2 cm. longo) 4 cm. diam., in sicco obscure angulatus.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh 14101* (TYPE, AA), alt. 70 m., frequent tree of secondary forest in the flood plain, April 30, 1939 (tree 19 m. high, diameter 38 cm.; crown not widespreading; bark 8 mm. thick, grey-brown, fissured; wood red-brown; flowers light green; fruits green); same locality, *Brass & Versteegh 13589* (AA), alt. 350 m., occasional tree on a ridge of primary rain-forest, April 19, 1939 (tree 27 m. high, diameter 49 cm.; crown not widespreading; bark 15 mm. thick, grey, scaly, fissured wood red-brown; sterile). BRITISH NEW GUINEA: Palmer River, 2 miles below junction of Black River, *Brass 6921* (AA), alt. 100 m., in riverine forest, June 1936 (small substage tree 8 m. high; leaf nerves brown; small brown flowers in erect solitary panicles); Koitaki, *Carr 12683* (NY), alt. 450 m., forest, June 25, 1935 (tree 36 m. tall; flowers green).

The leaves of this species are very like those of *E. rubescens* (Bl.) Bl. and *E. macrophylla* (Bl.) Boerl. from Malaya, but the inflorescence is longer, more branched and spreading, and the flowers are very small. *Brass 6921* is placed here although the leaves have more pronounced venation and the leaf base is more cuneate than obtuse. Also, the branchlets appear greyish rather than reddish brown. The Carr number is rather doubtfully placed here, but is probably the same. The leaves have a tendency to be smaller, less spreading and the flowers perhaps larger.

In connection with *E. Brassii* the following should be considered: NORTHEASTERN NEW GUINEA: Morobe District, Wareo, *Clemens 1421* (AA), alt. 600 m., Jan. 1936. This is more robust throughout than *E. Brassii*. The leaves are more coriaceous, the petioles thicker, the inflorescence stouter and more pubescent, and the flowers larger, although not approaching the proportions of those of *E. rubescens*. The general coarseness of the branchlets, the leaves, and their reticulation recall *E. praeclara*, also from Malaya. The flowers of the former are, however, smaller and the number of veins less than occur in the latter.

***Endiandra Clemensii*, spec. nov.**

Arbor? ramis griseis rimosis cicatricosis, ramulis brunnescentibus papillo-sis. Folia opposita vel alternata, late lanceolata, 15–18 cm. longa, 4.5–7 cm. lata, glabra, coriacea, leviter obtuse acuminata, basi acuta attenuata, margine undulata, supra nitida, subtus glauca, penninervia, nervis supra planis subtus elevatis pallide flavis, costa subtus papillosa, utrinque conspicue crasseque reticulata, petiolis crassis ad 1.5 cm. longis brunnescentibus glabrescentibus. Inflorescentia axillaris, laxe paniculata, ad 17 cm. longa, pauciflora, pedunculis ad 0.5 cm. longis. Flores $\pm$ 2 mm. longi, glabrescentes, pedicellis ad 2 mm. longis pubescentibus, perianthii lobis punctatis. Fructus ignotus.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens 1742* (TYPE, AA), alt. 900 m., Jan. 29, 1936; *Clemens 1848* (AA), alt. 1050 m., Feb. 15, 1936 (tree dbh. 0.30 m.; flower yellow-green).

Ordinarily one would hesitate to describe a new species on such fragmentary material as is represented by this number, but the thickly coriaceous undulate leaves with light yellow venation and strong coarse reticulation set it apart. Also the sparsely flowered, loose, spreading panicles with flattened branchlets, covered with minute papillae, have their share in marking it as new. There is a suggestion of similarity in the general character of the leaves to those of *E. reticulata* Gillespie from Fiji, but the

resemblance ceases there, *E. reticulata* having smaller leaves and inflorescences.

It should be noted here that *Clemens 1848* consists of a sterile shoot with much larger leaves and branchlets that are striate, complanate at the nodes particularly, and with the same papillate condition obtaining on the young parts of the branchlets and the lower surface of the elevated costa of the leaves. An inflorescence, unattached but with the number, corresponds very well with that of the type, even to the oil dots on the corolla lobes.

***Endiandra glandulosa*, spec. nov.**

Arbor 15–22 m. alta, ramulis glabrescentibus mox glabris teretibus striatis rimosis lenticellatis, ultimis glanduloso-papillosis atro-rubrescentibus. Folia subopposita vel alternata, elliptica vel lanceolato-elliptica, 5–8(–10) cm. longa, 2–4(–5.5) cm. lata, percoriacea, obtuse acuta vel abrupte obtuse acuminata vel obtusa, basi cuneata, margine revoluta, utrinque glabra, novellis fulvo-pilosis, subtus glauca, fide coll., utrinque supra conspicue subtus obscure glanduloso-papillosa, penninervia, nervis 6–10 utrinque inconspicuis, costa supra impressa, subtus elevata glanduloso-papillosa, petiolis ad 1.5 cm. longis fuscis glanduloso-papillosis glabrescentibus mox glabris. Inflorescentia subterminalis, paniculata ad 7 cm. longa, fulvo-pubescent, utrinque glanduloso-papillosa, pedunculis ad 4 cm. longis. Flores 2–3, virides fide coll., 3 mm. longi, extus glabri, intus pubescentes, perianthii lobis glanduloso-punctatis subgibbosis, pedicellis 1.5 mm. longis pubescentibus, bractea lanceolata solitaria suffulti. Infructescentia ad 8 cm. longa, utrinque glabra, glanduloso-papillosa. Fructus rubro-brunnescent fide coll., glaber, glanduloso-papillosus, ellipsoideus, apice basique obtuse leviter angustatus, $\pm 2.5 \times \pm 1.5$ cm., pedicello crasso glabro rubro-brunnescente ± 5 mm. longo.

NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, *Brass 13678* (TYPE, AA), alt. 900 m., common in mossy-forest canopy layer, March 1939 (tree 15 m. high, 0.30 m. diameter; leaves glaucous underneath and the edges recurved; flowers green; fruit unripe); same locality, and alt., *Brass & Versteegh 13144* (AA), frequent tree on a ridge of mossy-forest, Mar. 12, 1939 (tree 22 m. high, diameter 46 cm.; crown not widespreading; bark 17 mm. thick, dark brown, scaly, rough, with a little gum; flowers white; fruits red-brown); 6 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 12580* (AA), alt. 1200 m., occasional tree on a ridge of primary forest, Feb. 26, 1939 (tree 22 m. high, diameter 47 cm.; crown not widespreading; bark 13 mm. thick, brown, rough, shallowly fissured; wood light brown; fruits green); 15 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 11968* (AA), alt. 1580 m., frequent tree on a ridge of primary forest, Jan. 23, 1939 (tree 26 m. high, diameter 46 cm.; crown not widespreading; bark 11 mm. thick, black, scaly; wood light brown; flowers white; young fruits green).

The striking feature of this *Endiandra* is the prevalence of glandulose papillae on the ultimate branchlets. The elliptic-lanceolate leaves, greenish brown on drying, also are completely covered with glandular protuberances. The young branchlet tips just past the bud stage are very closely appressed tawny-pubescent, this condition very soon passing. The nearest relatives of this species are found in New Caledonia. *Endiandra Baillonii* Guill. and *E. micrantha* Schlecht. belong in the group, but do not have the profusion of glandular prominences. The last cited specimen was included here only after much consideration. The glandular papillae on the ulti-

mate branchlets and leaves are not as obvious on this specimen, although present in almost as great a number. The leaves are smaller on the whole, not more than 7 cm. in length and 3.3 cm. in width. A large portion of the flowers examined have anthers opening by a single valve instead of the conventional two found in *Endiandra*. It was only by dissecting numerous flowers from the duplicate specimens that typical *Endiandra* stamens were found. Eventually both types were discovered in the same flower. Where the single valve occurs it is semi-lunar or dumbbell-shaped in outline. In other respects the freak flowers are similar to those of the type of *E. glandulosa*.

It is interesting to note that Hooker (Ic. Pl. **16**: t. 1515. 1886) in describing *Syndiclis paradoxa* states "A very remarkable genus, allied to *Endiandra*, the only one of the Order with a 1-celled ovary with a single valve, the emargination of which latter possibly indicates that it and the cell are formed by the confluence of two." *Syndiclis* is very probably an *Endiandra* with freak stamens. If Hooker had had more abundant material at his disposal it is possible that he might have discovered flowers of the normal *Endiandra* type, bearing two-valved anthers. As far as I have been able to ascertain, the type material is the only known material of the genus *Syndiclis*.

Endiandra Ledermannii Teschner in Engl. Bot. Jahrb. **58**: 415. 1923.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, Brass 7453 (AA), plentiful in rain-forest substage, Aug. 1936 (tree 15–16 m. high; leaves brownish underneath; fruit solitary, lateral or axillary, smooth, purple-brown).

The leaves of the above are on the whole less broad than those of Teschner's type, as he described it, but there can be no doubt that the Brass number is a fruiting specimen of *E. Ledermannii*.

Endiandra Merrilliana, spec. nov.

Arbor 12 m. alta, ramulis minute pallide ferrugineo-puberulis striatis. Folia alternata, lanceolata vel anguste elliptica, 4–6.5 cm. longa, 1.5–2.8 cm. lata, supra glabrescentia, subtus minute adpresse pubescentia paullo glauca, coriacea, obtuse vel leviter obtuse acuminata, saepe rotundata, basi cuneata saepe rhomboidea, penninervia, nervis 4–5, nervis et costa supra impressis dense pubescentibus, subtus elevatis pallide ferrugineo-pubescentibus, conspicue et regulariter minute elevato-areolata, petiolis gracilibus, ad 1 cm. longis minute pallide ferrugineo-puberulis. Inflorescentia axillaris, paniculata, ad 4.5 cm. longa, pauciflora, utrinque pallide ferrugineo-pubescentibus, pedunculis brevibus. Flores + 2.5 mm. longi, virides, fide coll., 3 staminibus in annulum crassum mutatis, pedicellis ad 2 mm. longis. Fructus purpureo-ater, fide coll., in sicco etiam glaucus, glaber, tuberculatus, ellipsoideus, 1.5 × 1 cm., calycis reliquiis subtentus, pedicello leviter incrassato pubescente.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, Brass 8589 (TYPE, AA), rain-forest substage, Dec. 1936 (tree 12 m., bark rough, lenticellate; leaves grey underneath; flowers green; fruit purple-black).

This species is the third only of the genus recorded from New Guinea to bear an annular ring of tissue in place of the first and second order of

stamens absent in the flower of *Endiandra*. The other two species are *E. flavinervis* and *E. microphylla*, described by Teschner from Northeastern New Guinea. The former is readily distinguishable because of its glabrous branchlets and smaller, completely glabrous leaves with yellow nerves. From the latter it may be separated by the glaucous lower leaf surface displaying prominent nerves clothed with a pale ferrugineous pubescence. This same pubescence is also marked on the inflorescence, as opposed to the fulvo-tomentose condition on that of *E. microphylla*.

The species is named for Dr. E. D. Merrill, Director of the Arnold Arboretum of Harvard University, whose interest in the Papuasian flora is well known.

Endiandra glauca R. Br. Prodr. 402. 1810.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7789 (AA), rain-forest outskirts, Sept. 1936 (substage tree, 6-7 m. high; underside of leaves glaucous; flowers red; fruit $\pm 2 \times 1$ cm., black with a covering of glaucous bloom); same locality and date, *Brass* 7762 (AA), (small tree 3 cm. high, in rain-forest undergrowth; leaves glaucous beneath; flowers pink); Lower Fly River, east bank opposite Sturt Island, *Brass* 8095 (AA), common on dry ridges in rain-forest, Oct. 1936 (weak undergrowth tree [3-5 m.]; leaves glaucous below; fruit hard, black, covered with glaucous bloom), Western Division, Dagwa, Oriomo River, *Brass* 5940 (AA, NY), alt. 40 m., common in creek bank gallery forests, Feb. 16, 1934 (tree 6-7 m., leaves glossy above, very glaucous beneath; flowers red).

The fruit of the specimens from New Guinea are somewhat more slender than those of the Australian species and more tuberculate.

Endiandra sphaerica, spec. nov.

Arbor gracilis ad 15 m. alta, ramulis glabris teretibus striatis griseis, ultimis pubescentibus, plus minusve angulatis brunnescentibus. Folia alternata, lanceolata, 7-14 cm. longa, 2.2-4.5 cm. lata, chartacea, acuminata, basi cuneata, supra glabra, nitida, subtus pilosa vel glabrescentia, glauca, penninervia, nervis 7-8 utrinque subconspicuis, costa supra canaliculata subtus elevata, supra laxe reticulata, petiolis gracilibus canaliculatis 7-12 mm. longis brunnescentibus pubescentibus mox glabris. Inflorescentia ignota. Infructescentia axillaris et terminalis, racemosa, ad 4 cm. longa, glabrescens, pedunculis 1-1.5 cm. longis. Fructus ater et glaucus, fide coll., glaber, globosus, apiculatus, 10-11 mm. diam., calyce persistente horizontaliter patente glabrescente, 6-lobato, pedicellis crassis 4-5 mm. longis.

BRITISH NEW GUINEA. Middle Fly River, Lake Daviumbu, *Brass* 7512 (TYPE, fruit AA), rain-forest substage, Aug. 1936 (slender tree attaining 15 m.; leaves glaucous below; nerves deeply impressed; fruit black, thickly covered with a glaucous bloom).

The species is near *E. glauca* R. Br. from Australia, but with small globose fruit instead of the oblong fruit of the latter, and with leaves shining on the upper surface.

Endiandra fulva Teschner in Engl. Bot. Jahrb. 58: 416. 1923.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 2956 (AA), alt. 1220-1525 m., forest hills, April 25, 1936 (tree, dbh. 15 cm.; flower white, 3-merous). NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12579 (AA), alt. 1300 m., common tree of primary forest on a ridge, Feb. 25, 1939 (tree 25 m. high, diameter 44 cm., with fairly small crown; bark 9 mm. thick, brown, fairly rough; wood red-brown; fruit green).

Teschner's notes indicate that *E. fulva* has dark brown bark, yellowish or reddish white flowers, and leaves shining green on both sides with yellow nerves. Brass, on the other hand, does not note the leaf characters apparent in the collection Teschner had at his disposal. Clemens mentions the flower as "white." Teschner describes the leaves as minutely areolate, whereas in the two numbers cited above the leaves are minutely reticulate. These, however, are minor differences which do not exclude them from *E. fulva*.

Endiandra impressicosta, spec. nov.

Arbor parva, cortice exfoliato, ramulis glabris griseo-brunneis. Folia alternata, oblongo-lanceolata vel elliptica, (4-)6-10.5(-15) cm. longa, (2-)3.5-5(-6.5) cm. lata, glabra, coriacea, obtuse acuminata, raro acuta vel retusa, basi acuta, saepe inaequali, supra nitida, penninervia, nervis numerosis supra obscuris subtus paullo minus obscuris, costa supra impressissima saepe in sicco subtus elevata fuscior, minute areolata, petiolis crassis ad 1.5 cm. longis atro-rubrescentibus glabris. Inflorescentia axillaris et subterminalis, paniculata, 3-10 cm. longa, multiramosa, multiflora, glabrescens vel minute pallide pubescens, pedunculis ad 2.5 cm. longis, rubrescentibus glabrescentibus. Flores $\pm$ 3 mm. longi, gilvi, fide coll., in sicco perianthii lobis glaucis glabrescentibus, pedicellis ad 1 cm. longis pubescentibus. Fructus purpureo-ater, fide coll., glaber, in sicco rugosus, anguste ellipticus vel ovoideus, asymmetricus, 5×2.4 cm., calyce deciduo pedicello crasso ad 1.2 cm. longo atro-rubrescente.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7619 (TYPE, AA), rain-forest canopy, Aug. 1936 (bark hard, brown, exfoliating in small blocks or scales; flowers cream-coloured); Lower Fly River, east bank opposite Sturt Island, *Brass* 8078 (fruit, AA), small tree of flooded river banks in rain-forest, Oct. 1936 (flowers cream coloured; fruit purple-black, narrow, ovoid, $\pm$ 5 cm. long); same locality *Brass* 8224 (AA), a small canopy tree of the ridges in rain-forest, Oct. 1936 (bark brown, thick, somewhat scaly; leaf margins narrowly recurved; fruit smooth, glaucous, black, $\pm 5 \times 3.5$ cm.).

It is possible that this species belongs to *E. multiflora* Teschner. From the description the following differences manifest themselves. Teschner's species is a tree 20-25 m. high, with grey bark; the leaves may be obovate as well as elliptic and attenuate at the base, never more than 11 cm. long, somewhat shining above with lateral nerves numbering from 8 to 20, often very small and obscure, with the costa white; the petiole is up to 1 cm. long; the flowers are greenish white and the perianth lobes densely pubescent without. Opposing these are the characters of the new species *E. impressinervia*, which is a small canopy tree with hard, brown bark exfoliating in small blocks or scales; the leaves are oblong-lanceolate or elliptic, not attenuate at the base, though frequently unequal, up to 15 cm. long occasionally, shining above, the lateral nerves numbering up to 10, scarcely discernible above, and very faintly so below, with no mention of a white costa by the collector; the petiole is up to 1.5 cm. long; the flowers are cream-coloured and the perianth lobes glabrescent without, and in the dried state definitely glaucous. The latter character would most certainly have been mentioned by Teschner in his description of *E. multiflora* had it been present, for it is one of the striking features of *E. impressicosta*. For

these reasons it has seemed advisable to describe this plant as new. *Brass* 8224 has, on the whole, larger leaves, more conspicuously areolate and less shining on the upper surface.

***Endiandra solomonensis*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris striatis atro-rubrescentibus. Folia alternata vel opposita, elliptica, 7–12 cm. longa, 3–6.5 cm. lata, glabra, coriacea, obtusa, basi cuneata, saepe inaequali, supra nitida, penninervia, nervis 6–8, utrinque inconspicuis, costa nervisque utrinque conspicuis elevatis, rubrescentibus, utrinque dense crasseque reticulata, petiolis paullo crassis 1–1.3 cm. longis atro-rubrescentibus glabris. Inflorescentia axillaris, subterminalis, brevis, paniculata(?), ad 2 cm. longa, laxa, glabra, pauciflora, pedunculis $\pm$ 5 mm. longis gracilibus. Flores 2 mm. longi, glabri, pedicellis 4 mm. longis gracilibus glabris. Fructus ater, nitidus, fide coll., glaber, anguste ovoideus vel ellipsoideus, 4.2 cm. longus, 2.2 cm. diam., fide coll., calycis decidui reliquiis subtentus, pedicello breviter crasso glabro.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2109 (TYPE, AA), alt. 900 m., common in rain forest, Aug. 18, 1930 (very large tree up to 20 meters high; well-advanced flower buds on specimens; fruit immature only one on specimens, oval-shaped with a pointed end; common name: "Cum-cogilu"); same locality, *Kajewski* 1998 (AA), alt. 800 m., common in rain-forest, Aug. 1, 1930 (medium-sized tree up to 20 meters high; fruit shining black when ripe, length 4.2 cm., diameter 2.2 cm.; common name: "Mu-eh").

The short slender glabrous inflorescence and the shining coriaceous leaves, so coarsely and conspicuously reticulate as nearly to obscure the very delicate nervation, at once set this interesting species apart. From the description of *E. fulva* Teschner from Northeastern New Guinea, it appears that *E. solomonensis* may be somewhat related, but it is not a certainty.

***Endiandra montana* C. T. White in Contr. Arnold Arb. 4: 36. 1933.**

NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13142 (AA), alt. 800 m., common tree of secondary rain forest in the flat plain, March 11, 1939 (tree 24 m. high, diameter 43 cm., crown fairly small; bark 7 mm. thick, grey, shallowly fissured, with a little gum; wood red-brown; fruits green).

The Australian type is a "small twisted and gnarled tree up to 6 m. high" at 1300 m. altitude, while the New Guinean number is a larger tree at 800 m. altitude. There is no other point of difference except perhaps the smoother surface of the fruit found on the plant from New Guinea.

***Endiandra Teschneriana*, spec. nov.**

Arbor, ramulis glabrescentibus teretibus minute papillosis rubrescentibus. Folia alternata, elliptica, 11 (6–14) cm. longa, 4.5 (3–6.5) cm. lata, coriacea, obtuse acuminata vel obtusa, basi cuneata, supra glabra, subtus minute pilosa, mox glabrescentia, demum glabra, penninervia, nervis (6–)10–15, utrinque subinconspicuis, supra dense reticulata, petiolis crassis 1–1.5 cm. longis pubescentibus. Inflorescentia axillaris, brevis, racemoso-paniculata, ad 3.5 (–6) cm. longa, pubescens, pedunculis ad 4 cm. longis glabris. Flores $\pm$ 6 mm. longi, extus glabrescentes, perianthii lobis 6, carnosus 3 exterioribus quam 3 interioribus majoribus, staminibus 3, conicalibus. Fructus ignotus.

NORTHEASTERN NEW GUINEA: Wälder der Saugueti Etappe, *Schlechter* 18908 (TYPE, AA), alt. 300 m., Dec. 2, 1908.

A rather fragmentary specimen upon which to base a type. It is distinguished by coriaceous reticulate leaves of which the midrib is prominently elevated on both surfaces and the veins are rather obscure throughout. The rather short racemose paniculate inflorescence seems always to be borne in the axils of subterminal leaves.

Endiandra Archboldiana, spec. nov.

Arbor ad 30 m. alta, ramulis glabrescentibus, junioribus pubescentibus, paullo sulcatis minute papillois brunnescentibus. Folia alternata, elliptica vel oblongo-elliptica, 8–15 cm. longa, 4.5–8.5 cm. lata, glabra, coriacea, obtuse acuminata, basi obtusa, saepe acuta, inaequalia, subtus nitida, penninervia, nervis 4–6, supra plus minusve impressis subtus elevatis pallide-rubrescentibus, costa rubescente, utrinque conspicue minute reticulata, petioli crassis canaliculatis ad 1.5 cm. longis rubescentibus glabris, junioribus adpresse fulvo-pubescentibus. Inflorescentia subterminalis, axillaris, paniculata, ad 7 cm. longa, minute adpresse fulvo-pubescentis, pauciflora, floribus in ramulis summis dense aggregatis, pedunculis ad 2 cm. longis rubescentibus. Flores $\pm$ 2 mm. longi, flavi, fide coll., fulvo-pubescentes, pedicellis $\pm$ 2 mm. longis pubescentibus. Fructus ignotus.

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3813 (TYPE, AA, NY), alt. 500 m., common in rain-forests, April 20, 1933 (tree 30 m. or more, with thick, grey, lenticellate bark; wood pale, soft; leaves smooth above, shining beneath; flowers small, yellow; fruit not seen).

Endiandra Archboldiana is distinguished by its minutely reticulate leaves, shining below, and its somewhat short fulvo-pubescent inflorescence with rather few flowers densely clustered at the tips of the floral branchlets. There seems to be no species with which the above may claim close relationship. The petals under great magnification show the presence of oil glands throughout. To date the majority of species described in the family have not given a detailed picture of the floral parts. Hence, it is impossible to indicate any relationship on this basis. With type material available it is possible that this character may in the future assume a taxonomic significance heretofore ignored.

Brassi dendron, gen. nov.

Arbores. Folia opposita vel alternata, simplicia, papyracea, penninervia. Ramuli graciles, teretes. Inflorescentia axillares vel subterminales, racemosae vel paniculatae, sine involucris. Flores hermaphroditi; perianthii lobi 6, subaequales, carnosii, tubo brevi; stamina 6, exterioribus quam interioribus majoribus introrsis, interioribus extrorsis, series tertia quartaque nullae; antheris 2-loculatis; ovarium irregulariter ovoideum, stigma subsessile, ovulo solitario pendulo oblongo angulato.

TYPE SPECIES: *Brassi dendron fragrans* Allen.

Brassi dendron fragrans, spec. nov.

Arbor gracilis ad 20 m. alta, ramulis glabris teretibus striatis olivaceis. Folia opposita vel alternata, plana, fide coll., lanceolato-elliptica, papyracea, acuminata vel obtuse acuminata, raro obtusa vel rotundata, basi cuneata, utrinque glabra, supra olivacea, opaca, subtus nitida, pallida, penninervia, nervis $\pm$ 15 utrinque plus minusve obscuris supra leviter impressis inconspicuis subtus concoloribus leviter elevatis, costa utrinque conspicua

brunnea supra canaliculata subtus elevata, utrinque laxe conspicueque reticulata, petiolis gracilibus 7(-10) mm. longis brunnescentibus glabris. Inflorescentia axillaris et subterminalis, racemosa vel racemoso-paniculata, 2(-3) cm. longa, plerumque 1.5 cm. lata, minute inconspicueque pubescens 2-3-flora, pedunculis ad 1 cm. longis. Flores 6-7 mm. longi, gilvi et fragrantés fide coll., utrinque glabri, corolla ad anthesin patente, perianthii lobis 6, carnosus, margine translucente, glanduloso-punctatis, ad 4 mm. longis, tubo 1 mm. longo, staminibus 6, sessilibus, plus minusve oblongis vel oblongo-lanceolatis utrinque minute glanduloso-papillosis, 3 exterioribus introrsis, 2.5 mm. longis, 3 interioribus extrorsis, saepe ut videtur plus minusve cum petalis perpendicularibus, $\pm$ 1.5 mm. longis, ovarium irregulariter ovoideum, stigma subsessile. Inflorescentia ♀ et fructus ignoti.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7465 (TYPE ♂, AA), rain-forest subcanopy, Aug. 1936 (rather slender tree 20 m. tall; bark brown, lenticellate, slightly fissured; leaves flat, glossy below; flowers cream coloured, fragrant).

The genus is close to *Endiandra*, but differs in having six perfect stamens instead of three, the three interior being definitely smaller. There is an absence of the third series of stamens as well as staminodia and there is no appearance of glands. The species is distinguished by coarsely and prominently reticulate papery leaves, glossy below, with nervation inconspicuous above and slightly more so below. The short, few-flowered usually racemose, occasionally racemose-paniculate inflorescences without bracts, and the fragrant flowers with fleshy perianth lobes which are thinner and somewhat transparent at the margin are presumably specific characters.

The genus is named in honor of Mr. L. J. Brass, the botanical collector of the Archbold Expeditions into New Guinea.

Cassytha Linnaeus

Cassytha filiformis Linnaeus, Sp. Pl. **1**: 35, 1753; Nees, Syst. Laurin. 642, 1836; Meissner in DC. Prodr. **15**¹: 255, 1864; K. Schum. Notizbl. Berl. **1**: 49, 1895; Warburg in Engl. Bot. Jahrb. **13**: 315, 1895; K. Schum. Notizbl. Berl. **2**: 117, 1898; K. Schum. & Lauterb. Fl. Deutsch. Schutz. Südsee 334, 1901; Val. Bull. Dept. Agr. Ind. Neerl. **10**: 13, 1907; Reching. Denkschr. Math. Nat. Kl. Ak. Wiss. Wien. **85**: 283, f. 12. (Reprint Bot. Zool. Ergeb. Samoa. **3**: 109) 1910; C. T. White in Proc. Roy. Soc. Qld. **35**: 31, 1922; Schmidt in C. T. White, Jour. Arnold Arb. **10**: 216, 1929.

Cassytha filiformis L. var. *β subpubescens* Meissner in DC. Prodr. **15**¹: 255, 1864.

Cassytha filiformis L. var. *pubescens* K. Schum. & Hollr. Fl. K. W. Land 43, 1889.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7502 (AA), parasite on underbrush of forest borders, Sept. 1936; coast between Oriomo and Fly Rivers, *Brass* 6417 (AA), parasitic in large quantities on low vegetation along beaches, March 31, 1936; Western Division, Tarara, Wassi Kussa River, *Brass* 8639 (AA), grass parasite in savannah-forests; abundant on wet flats, Jan. 1937; Wuroi Oriomo River, *Brass* 5795 (AA, NY), alt. 10-30 m., on small trees of savannah-forest patches Jan.-March, 1934 (stems smooth green); Gulf Division, Maclatchie Point, *Brass* 1180 (AA), on beach trees, March 19, 1926; Eastern Division, Bomgwina, *Brass* 1615 (AA), on *Ipomoea pes-caprae*, June 1, 1926. NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8886 (AA), alt. 20-100 m., abundant on small trees and shrubs of secondary savannahs, June 29, 1938.

SOLOMON ISLANDS: San Cristobal: Star Harbour, *Brass* 3069 (AA), very plentiful in loose coral sand near the sea, Oct. 18, 1932 (trailing over sand or climbing and twining on low beach vegetation).

The following numbers from British New Guinea, *Brass* 5795, 8639 and from Netherlands New Guinea, *Brass* 8886, probably belong with the widespread *C. filiformis*, though they vary in slight detail such as outline of calyx-lobes and bracteoles. Since the age of the plant causes pubescence to vary, the variety β *subpubescens* has become a part of the species.

***Cassytha Archboldiana*, spec. nov.**

Parasitica aphylla, caulibus sat gracilibus, 5 mm. crassis, ramosis, glabris vel glabrescentibus, ramulis junioribus dense fulvo-tomentellis. Inflorescentia solitaria vel gemina, paniculata, pedunculata, ad 7-flora, paniculis ad 2 cm. longis, pedunculis erectis ramosis, pubescentibus, paniculis et ramulis pubescentibus, bracteis 3, ad 1 cm. longis acutis, pubescentibus subtentibus, floribus 2-6, 2 mm. longis sessilibus, 1-2 mm. distantibus paniculae apice bracteolis 3 triangularibus acutis ciliolatis pubescentibus subcarinatis, 0.7 mm. longis, perianthii lobis exterioribus 3, ovatis ciliolatis, subcarinatis, 0.5 mm. longis, interioribus 3, ovalibus acutis glabris subcarinatis, margine minute papillois, staminibus 9, 6 exterioribus 1.5 mm. longis, bilocularibus, introrsis, 3 interioribus 1 mm. longis, abortivis, cum exterioribus alternatis, 3 staminodiis anguste ovatis, biglandulosis; ovario ellipsoideo, stylo gracile. Fructus subglobosus 5 mm. longus, 4 mm. latus, glaber, bracteolis persistentibus subtentus, perianthii lobis plus minusve erectis persistentibus coronatus.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11675 (TYPL. AA), alt. 1600 m., common on grass and shrubs, Dec. 1938.

The species differs from the widespread *C. filiformis* L. and the Australian *C. paniculata* in having branched inflorescences which are 2 cm. or less in length. The tawny-pubescent young shoots are also distinctive.

***Cassytha tenuis*, spec. nov.**

Parasitica aphylla, caulibus tenuibus, minusquam 0.3 mm. crassis, glabris obsolete striatis. Inflorescentia solitaria, spicata, pedunculata, pauciflora (1-3), spicis 10-12 mm. longis, pedunculis erectis filamentosis, cano-pubescentibus, bracteis 3 minutis, acutis, ciliolatis, subtentibus, floribus 1-3, 1-1.5 mm. longis, sessilibus, 0.5-1.5 mm. distantibus in tantum aggregatis apice spicae, bracteolis 3 ovatis acutis ciliolatis, 1 mm. longis, perianthii lobis exterioribus 3, ovatis glabris, 1.5 mm. longis, margine minute papillois, staminibus 9, 0.5 mm. longis, antheris bilocularibus, 6 exterioribus introrsis 3 interioribus alternatis 3 staminodiis rotundatis, biglandulosis; ovario ellipsoideo, stylo gracile. Fructus subglobosus, 3.5 mm. longus, 3 mm. latus sparse cano-pubescentibus, bracteolis persistentibus subtentus, perianthii lobis plus minusve erectis persistentibus coronatus.

BRITISH NEW GUINEA: Western Division, Mabaduan, *Brass* 6514 (TYPE, AA), parasitic on grass in savannah-forests and forming tangles close to the ground, April 1936.

Cassytha tenuis resembles *C. capillaris* L. from Malaya vegetatively, but the branches are even more slender and the inflorescence is pedunculate rather than sessile as in the former species. The dense whitish pubescence on the peduncles of the inflorescence and the sparse whitish pubescence of the mature fruit of the Papuan species are also outstanding.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

RECORDS OF INDO-CHINESE PLANTS, III*

E. D. MERRILL

THIS paper is to a large degree based on material submitted by Dr. A. Pételot for identification. In it are recorded about forty-five species originally described from extra-limital sources, these being new records for Indo-China. Forty-three species and varieties are described as new. Certain changes are made in nomenclature for previously described species and some are reduced to synonymy. The types of the new species herein described are deposited in the herbarium of the Arnold Arboretum.

ARACEAE

Cryptocoryne longispatha sp. nov. § *Bitubulosae*.

Planta ut videtur submersa, rhizoma verticali, circiter 6 mm. crassa, internodiis 2–5 mm. longis; foliis in vivo undulatis, haud bullatis sed in sicco distanter transversim subplicatis, olivaceis, membranaceis, anguste oblongo-lanceolatis, oblongo-oblanceolatis vel lineari-lanceolatis, 17–22 cm. longis, 1.2–1.8 cm. latis, acutis vel leviter acuminatis, deorsum longe angustatis, basi cuneatis vel decurrentibus, costa circiter 1.5 mm. lata, nervis lateralibus utrinque 3 vel 4, angulo acutissimo a costa abeuntibus, adscendentibus, distantibus, gracilibus, obscuris, nervulis transversalibus gracilibus, obscuris, distantibus, vel subobsoletis; petiolo 8–12 cm. longo, deorsum longe vaginato; pedunculo 4–5 cm. longo; spathae tubo inferiore circiter 1.5 cm. longo, superiore 14–18 cm. longo, 3–4 mm. amplo (plano) laevi, haud transverse rugoso, lamina anguste lanceolata, 2.5–3 cm. longa, longissime anguste caudata, deorsum laxa, ad apicem subconfertim spiraliter contorta, spadicebus 1.5–2 cm. longis, stigmatibus sessilibus vel breviter stipitatis, partibus masculinis ellipsoideis, circiter 3.5 mm. longis, 2.5 mm. diametro, graciliter stipitatis, stipite 8–10 mm. longo.

INDO-CHINA, Tonkin, Thoi Nguyen Province, Phan Mê, *Pételot 2681*, Nov. 12, 1939, the plants deeply buried in the sand, along the borders of streams, the undulate leaves floating.

A species apparently belonging in the group with *Cryptocoryne retrospiralis* (Roxb.) Fisch. and *C. crispatula* Engl., the latter being the only representative of the genus hitherto recorded from Indo-China (Laos and Bien-hoa). It differs from the latter in its much broader leaves and longer peduncles. From the blanched petioles it is suspected that the lower parts of the plant were buried in the sand to a depth of up to 10 cm. The dried leaves are not, or at most very slightly bullate, and the undulate character mentioned by the collector is reflected in the dried specimens by the characteristic narrow, irregular and distant transverse plicae which at first sight simulate straight lateral nerves, the folds being so very narrow.

*For the earlier papers in this series see Jour. Arnold Arb. **20**: 347–355, 1939; **21**: 364–391, 1940.

LILIACEAE

Paris Delavayi Franch. Jour. de Bot. **12**: 190. 1898.

INDO-CHINA, Tonkin, Chapa, *Pételot 6195*, April 1936, humid places in forests, alt. 1500 m. Yunnan, Szechuan, and neighboring provinces in China, the type from Szechuan.

Paris Fargesii Franch. Jour. de Bot. **12**: 190. 1898.

INDO-CHINA, Tonkin, Chapa, *Pételot 6196*, April 1936, humid places in forests, alt. 1500 m. Yunnan, Szechuan, and Kweichow, the type from Yunnan.

Paris hainanensis Merr. Philip. Jour. Sci. **23**: 238. 1923.

INDO-CHINA, Tonkin, Chapa, *Pételot 6194*, April 1936, in humid places in open forests, alt. 1500 m. Hainan.

It is of interest to note that in 1934, when the Liliaceae of Indo-China was treated by Gagnepain, no representative of this genus was known from that country, but two years later Dr. Pételot collected three distinct species in the same general locality, Chapa, in northern Tonkin.

Pleomele terniflora (Roxb.) comb. nov.

Dracaena terniflora Roxb. Hort. Bengal. 24. 1814, *nomen nudum*, Fl. Ind. ed. 2, **2**: 159. 1832; Kurz, For. Fl. Brit. Burma **2**: 545. 1877; Hook. f. Fl. Brit. Ind. **6**: 329. 1892.

INDO-CHINA, Tonkin, Sontoy Province, Da Chong, *Pételot 2663*, April 14, 1940, in shrubby savannas. Silhet and Khasia to Burma.

Baker, Jour. Bot. **11**: 263. 1873, manifestly by error, placed this as a synonym of the distinctly different *Dracaena spicata* Roxb., while Hooker f., Fl. Brit. Ind. **6**: 329. 1892, recognized Roxburgh's two species as distinct, but indicated difficulties in determining the exact status and relationships of *D. terniflora* Roxb. Pételot's material agrees rather closely with the original description and with Kurz's consideration of 1877. Roxburgh's type was from Silhet. The indicated distribution is that given by Hooker f. From Gagnepain's description of *Dracaena elliptica* Thunb., Lecomte, Fl. Gén. Indo-Chine **6**: 800. 1934, it is suspected that he included other than the typical form of that species, but his description scarcely covers the form that I here refer to Roxburgh's species.

Pleomele Salisbury is a very narrow generic segregate from *Dracaena* Vandelli, and few botanists have followed N. E. Brown, Kew Bull. **1914**: 273-279. 1914, in reinstating Salisbury's genus. He transferred to it, without discussion of the synonymy of the numerous species, and without literature citations, about one hundred species originally described by various authors under *Dracaena*.

MORACEAE

Cudrania fruticosa Wight ex Kurz, For. Fl. Brit. Burma **2**: 434. 1877; Hook. f. Fl. Brit. Ind. **5**: 539. 1888; Schneider in Sargent, Pl. Wils. **3**: 307. 1916.

INDO-CHINA, Tonkin, Langson Province, Dong Mo, *Pételot 6615*, Nov. 8, 1940, a spiny shrub with scandent branches on calcareous formations. Eastern Bengal to Burma and Yunnan.

It may be that Kurz, in publishing *Cudrania fruticosa* Wight, intended to base it on *Batis fruticosa* Roxb. Fl. Ind. ed. 2, **3**: 763. 1832, but if so he failed to cite the latter. Hooker f. placed *Batis fruticosa* Roxb. as a doubt-

ful synonym; Roxburgh's description is altogether too short to judge what he may have intended to describe, but Roxburgh's species may well be the same as *Cudrania fruticosa* Wight.

***Ficus heterostyla* sp. nov. § *Covellia*.**

Arbor, partibus junioribus foliis subtus et infructescentiis castaneo-hirsutis, ramulis ultimis circiter 5 mm. diametro, consperse hispido-hirsutis; foliis oppositis, 25-30 cm. longis, 10-14 cm. latis, chartaceis, oblongo-obovatis, subabrupte graciliter (2.5-3 cm.) subcaudato-acuminatis, basi aequilateralibus vel leviter inaequilateralibus, obtusis vel subrotundatis, subtrinerviis, margine dentatis, dentibus parvis, 3-5 mm. distantibus, junioribus penicillatis, supra subasperis, olivaceis, ad costam subdense in parenchymate conspersissime hispido-hirsutis, pilis plerumque castaneis rigidis 1-2 mm. longis, subtus pallidioribus, praesertim ad costam nervosque perspicue hispido-hirsutis, pilis rigidis subferrugineis vel castaneis, in parenchymate pallidioribus brevioribusque; nervis primariis utrinque circiter 8, subtus perspicuis, elevatis, circiter ad marginem arcuato-anastomosantibus, nervis secundariis subparallelis, distantibus, reticulis subdistinctis; petiolo 5-6 cm. longo, hispido-hirsuto; stipulis oblongo-lanceolatis, caudato-acuminatis, circiter 2 cm. longis, extus in partibus expositis breviter adpresse hirsutis, carinatis, ad carina longe castaneo-hirsutis; fructibus in ramis specialibus efoliatis e basi trunco ortis, ut videtur epigeis, elongatis, ramis ultimis 8-20 cm. longis, partibus vetustioribus glabris vel glabrescentibus, junioribus perspicue hispido-hirsutis, pilis rigidis, castaneis, bracteis in ramulis ultimis oppositis, oblongo-ovatis, acutis vel acuminatis, 6-8 mm. longis, extus adpresse-hirsutis, superioribus plus minusve imbricatis, internodiis in ramulis ultimis 1-4 cm. longis, in axibus primariis saltem ad 12 cm. longis, ramulis ultimis plerumque oppositis; receptaculis obovoideis, circiter 1.5 cm. longis, pedunculatis, apice rotundatis, basi subacutis, in sicco castaneis et hispido-hirsutis, pilis castaneis, rigidis, circiter 1 mm. longis; bracteis suborbicularibus vel suborbiculari-reniformibus, rotundatis, ad 3.5 mm. longis et 4 mm. latis, extus plus minusve hirsutis, intus glabris, margine plus minusve scariosis, pedunculo 5-7 mm. longo, hispido-hirsuto; floribus ♂ paucis, 2-3 mm. longis, perianthio 0, antheris oblongo-ellipticis, 1 mm. longis; ♀ pedicellatis, pedicellis 1-2 mm. longis, glabris, perianthio 0, ovario obovoideo, leviter inaequilateraliter rotundato, circiter 1.2 mm. longo, stylis lateralibus, simplicibus, distincte hirsutis, 1 mm. longis; floribus cecidiferis ♀ simillimis sed stylis brevissimis (0.25 mm. longis) glabris.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2569 (TYPE), 5664, March 1936, and June 1940, in forests, alt. 400-500 m., the fruits on long branches from the base of the trunk.

It is possible that this form was included by Gagnepain in his concept of the common and widely distributed *Ficus hispida* Linn. f., and in fact, one of the cited specimens was received under that name. As *Ficus hispida* Linn. f. is described and illustrated by King, Wight, Roxburgh, and others, I am convinced that this Indo-Chinese form with elongated special apparently epigeous fruiting branches from the base of the trunk cannot be referred to the Indo-Malaysian *F. hispida* Linn. f., with relatively short inflorescences on the trunk and larger branches. This Indo-Chinese species differs also in its castaneous indumentum on the branchlets, leaves, infruc-

tescences and receptacles, as well as in its rather slenderly subcaudate-acuminate differently shaped leaves. It has in common with *Ficus hispida* Linn. f. the elongated styles of the pistillate flowers being distinctly ciliate-hirsute, while those of the gall flowers are very much shorter and entirely glabrous; this character holds for *Ficus hispida* Linn. f. and some other species of the section, such as *Ficus stolonifera* King, *F. Treubii* King, and *F. saemocarpa* Miq. As in other species of the *Covellia* group, gall flowers only occur in one set of receptacles, and staminate and fertile female flowers in others. In the currently accepted synonymy of *Ficus hispida* Linn. f., apparently *F. oppositifolia* Willd., at least as illustrated by Roxburgh, Pl. Coromandel 2: 14. t. 124. 1798 and by Wight, Ic. 2(4): 1. t. 638. 1844, and *F. daemonum* Koenig, as illustrated by Wight, op. cit. t. 641, are correctly placed. *Ficus hispida* Jacq. Hort. Schoenbr. 3: t. 315, certainly does not represent any species of the section *Covellia*.

***Ficus pubilimba* sp. nov. § *Urostigma*.**

Arbor ut videtur semi-epiphytica, ramis glabris, rugosis, ramulis ultimis hirsutis, rugosis, circiter 3 mm. diametro, stipulis caducis, terminalibus alabastrum simulantibus, oblongo-ovatis vel ovato-lanceolatis, acuminatis, coriaceis, extus hirsutis intus glabris; foliis alternis, coriaceis, integris, oblongis vel oblongo-ellipticis, 7–14 cm. longis, 3–5.5 cm. latis, in sicco pallidis, utrinque subaequaliter angustatis, basi acutis vel late acutis, breviter 3-nerviis, apice breviter late obtuseque acuminatis vel obtusis, supra glabris vel secus costam nervosque ciliato-hirsutis glabrescentibus, subtus distincte molliter pubescentibus, pilis brevibus, erectis vel patulis; nervis primariis utrinque perspicuis, subtus cum costa elevatis, circiter ad marginem arcuato-anastomosantibus, 1–2 cm. distantibus, secundariis reticulisque leviter elevatis; petiolo 1.5–3 cm. longo, pubescenti; receptaculis axillaribus, sessilibus, solitariis vel binis, globosis, glabris, 8–10 mm. diametro, bracteis 3, subreniformibus, late rotundatis, glabris vel obscure pubescentibus, circiter 2 mm. latis et 1.5 mm. longis; floribus ♂ paucis, staminibus solitariis, filamentis brevissimis, antheris suborbicularibus, 0.5 mm. diametro, perianthii segmentis 3, obovatis, subcucullatis, rotundatis, circiter 1.5 mm. longis; floribus ♀ cecidophorisque, cum pedicellis, 2–3 mm. longis, sepalis 3, oblongis vel oblongo-obovatis, rotundatis, circiter 1.5 mm. longis, ovarium subglobosum involucrantibus.

INDO-CHINA, Tonkin, Bac Giang Province, near a pagoda in the environs of Kep, Pételot 5732, Feb. 27, 1936.

I have not been able to place this specimen as representing any of the Indo-Chinese species admitted by Gagnepain, nor can I place it as representing any other described species. By King's arrangement of the Indo-Malaysian species it falls in his series one, subseries four, in the general alliance with *Ficus indica* Linn., from which it is readily distinguished by its indumentum and its small subtending receptacle bracts.

PROTEACEAE

***Helicia hainanensis* Hayata, Ic. Pl. Formos. 9: 87. 1920.**

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, Pételot 2619, July 2, 1940, a tree 7–8 m. high, in open forests, alt. 700 m. Kwangsi, Kwangtung, and Hainan.

***Helicia brevipetiolata* sp. nov.**

Arbor glabra, circiter 12 m. alta, ramis teretibus, pallide viridibus, obscure longitudinaliter striatis ramulis ultimis circiter 2 mm. diametro; foliis oblongo-obovatis, firmiter chartaceis, 17–25 cm. longis, 7–10 cm. latis, acuminatis, in sicco utrinque subconcoloribus, pallide viridibus, apice acuminatis, deorsum plus minusve angustatis, basi abrupte rotundatis circiter 1–1.5 cm. latis, margine distanter subcalloso-serratis, dentibus ad 2 mm. longis, 1–3 cm. distantibus; nervis primariis utrinque 9–10, distantibus, subtus elevatis, perspicuis, curvato-arcuatis, anastomosantibus, reticulis primariis laxis, sub lente distinctis; petiolo circiter 5 mm. longo, 4 mm. crasso, transverse subplicato-rugoso; racemis in axillis superioribus, glaberrimis, breviter (2–2.5 cm.) pedunculatis, multifloris; floribus circiter 1.7 cm. longis, pedicellis circiter 3 mm. longis, deorsum per paria connatis, bracteis lanceolatis, acuminatis, vix 1 mm. longis, deciduis, bracteolis deciduis, quam bracteis duplo brevioribus; ovario glabro, anguste ovoideo, stylo 1.5 mm. longo; antheris lineari-oblongis, 3 mm. longis; disci glandulis liberis, oblongo-ovatis, circiter 0.7 mm. longis, obtusis.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2628, June 4, 1940, altitude about 150 m.

A species with free disk scales, falling in the group with *Helicia tonkinensis* Lecomte but totally different from that and the closely allied *H. cochinchinensis* Lour. in its much larger, prominently toothed leaves. The short very stout petioles are transversely subplicate-rugose.

ARISTOLOCHIACEAE

***Asarum glabrum* sp. nov.**

Planta glabra, caulibus erectis, saltem 2–3-foliatis, 4–5 mm. diametro; foliis longe (10–12 cm.) petiolatis, ovatis, basi profunde cordatis, sursum angustatis et acute acuminatis, 12–21 cm. longis, 7–11 cm. latis, chartaceis, lobis basalibus rectis vel paullo divaricatis, oblongis vel ovatis, late rotundatis, 4–5 cm. longis, 3–4.5 cm. latis, nervis basalibus 3, lateralibus curvato-adscendentibus, subtus elevatis laxe subobscure reticulatis, venulis haud elevatis, additis binis in lobos basales extendentibus; floribus in axillis superioribus, solitariis, ut videtur erectis, tubo ovoideo, subfructu 3–3.5 cm. longo, ad 2.5 cm. diametro, basi late acuto vel subrotundato, lobis ovatis, obtusis vel subrotundatis, circiter 3 cm. longis et 2 cm. latis, longitudinaliter 7-nerviis, utrinque glabris, intus ad basim dense papillatis, papillis oblongis, circiter 1 mm. longis; seminibus obovoideis, 5 mm. longis; pedicellis circiter 3 cm. longis, sub fructu sursum incrassatis, curvatis; bracteis lanceolatis, acuminatis, 1.8 cm. longis, margine sursum plus minusve ciliatis.

INDO-CHINA, Sontoy Province, Mount Bavi, *Pételot* 2611, July 2, 1940, in open forests, altitude about 600 m.

A species characterized by its long petioled leaves laxly arranged on the upper parts of the stems, the leaf blade being gradually narrowed upward to the sharply acuminate apex, the broadly rounded basal lobes being parallel or only slightly diverging, as well as by being glabrous throughout except for the slightly ciliate bracts. The perianth lobes are ovate, rounded or broadly obtuse, glabrous on both surfaces, distinctly 7-nerved, and characteristically densely papillate on the base inside.

***Asarum reticulatum* sp. nov.**

Glabra, rhizomate repente, radicante, caulibus adscendentibus, brevibus, simplicibus vel depauperato-ramosis, ad 3 mm. diametro; foliis anguste ovatis vel late oblongo-ovatis, chartaceis, utrinque glabris, 10–15 cm. longis, 6–7 cm. latis, acutis vel breviter acute acuminatis, basi cordatis, lobis vix vel leviter patulis, ovatis, rotundatis, 2.5–3.5 cm. longis, 2.5–3 cm. latis, nervis primariis basalibus 3, perspicuis, subtus elevatis, laxe arcuato-anastomosantibus, additis binis paullo gracilioribus in lobos basales extendentibus, subtus laxe perspicue reticulatis, venulis elevatis, distinctis, reticulis primariis 5–10 mm. diametro; petiolo 6.5–7 cm. longo; perianthii tubo 3–3.5 cm. longo, extus glabro, anguste campanulato, basi acuto, 1.8 cm. lato (compresso) fauce leviter constricto ut videtur depresso, lobis late ovatis, rotundatis, circiter 2 cm. longis latisque, utrinque glabris, basi intus subtransverse verruculosis, pedicellis circiter 2 cm. longis; bracteolis lanceolatis, acuminatis, circiter 1.5 cm. longis, saltem ad marginem plus minusve ciliato-hirsutis.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2554, April 1935, in mossy humus, open forests, altitude about 1500 m.

In general characterized by being glabrous throughout, the leaves prominently and laxly reticulate beneath, the perianth about 4 cm. wide, the lower half of the lobes inside transversely verruculose, the lobes broadly ovate or orbicular-ovate, rounded, and about 2 cm. in diameter.

Lecomte, *Fl. Gén. Indo-Chine* 5: 53. 1910, admitted a single species of this genus from Indo-China, *Asarum Balansae* Franch., type from Mount Bavi; this species is also represented by *Pételot* 2555 from the type locality. O. C. Schmidt, *Notizbl. Bot. Gart. Berlin* 11: 100. 1931, recorded *Asarum caudigerum* Hance from Tonkin and described *A. Petelotii* O. C. Schmidt from Tam Dao, Tonkin, based on *Pételot* 3891. With the description of the above two new species the total number now known from Indo-China is five.

POLYGONACEAE

***Polygonum macranthum* Meisn. in DC. Prodr. 14: 107. 1856.**

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 6601, Nov. 1, 1940, in humid places, alt. 700 m. Northern India, western and central China, and Japan.

***Polygonum Thunbergii* Sieb. & Zucc. Fl. Jap. Fan. Nat. 2: 84. 1846; Steward, Contr. Gray Herb. 5(88): 83. 1930, cum syn.**

INDO-CHINA, Tonkin, Chapa, *Pételot* 1622, July 1924, alt. 1500 m. Assam, through China to Sakhalin, Japan and Formosa, southward to Sumatra.

Danser, *Bull. Jard. Bot. Buitenz. III. 8: 224. f. 14. 1927*, accepted the binomial *Polygonum hastatotrilobum* Meisn. (1865) for this species, which Steward, op. cit. 84 places as *P. Thunbergii* Sieb. & Zucc. var. *hastatotrilobum* (Meisn.) Maxim. Steward cites *Pételot*'s number, having seen the specimen in the University of California herbarium.

***Polygonum praetermissum* Hook. f. Fl. Brit. Ind. 5: 47. 1886; Steward, Contr. Gray Herb. 5(88): 86. 1930.**

INDO-CHINA, Tonkin, Balyn pagoda, near Hanoi, *Pételot* 791, Nov. 1922. India and Ceylon to Japan, southward to Luzon, but as yet not recorded from the Malay Archipelago.

The leaves of the cited specimen are twice as large as Steward admits for Hooker's species, yet I believe that the material is properly placed under *Polygonum praetermissum* Hook. f.

Rumex nepalensis Spreng. Syst. **2**: 159. 1825; Meisn. in DC. Prodr. **14**(1): 55. 1856; Wight, Ic. **5**(2): 8. *t.* 1810. 1852; Hook. f. Fl. Brit. Ind. **6**: 60. 1886.

INDO-CHINA, Tonkin, Chapa, *Pételot 2549*, August 1940, along roads, altitude about 1500 m. Northern India to western and central China.

The cited specimen agrees very closely with a large series of Yunnan collections, but *Pételot 2549* and most of the Yunnan material differ from Sprengel's species as currently described, and as illustrated by Wight, in the unbranched inflorescences and in the lower leaves being rounded rather than cordate.

ANNONACEAE

Artabotrys Petelotii sp. nov.

Frutex scandens partibus junioribus et foliis subtus plus minusve pubescentibus, ramis teretibus, glabris vel subglabris, ramulis ultimis 1.5–2 mm. diametro, dense breviter pubescentibus; foliis chartaceis, plerumque oblongis vel oblongo-ellipticis, aliquando deorsum leviter angustatis, 9–14 cm. longis, 3–5.5 cm. latis, obtuse acuminatis, basi late acutis, supra nitidis, glabris vel secus costam breviter pubescentibus, in sicco pallidis, subtus subopacis praesertim secus costam nervosque consperse molliter breviter pubescentibus; nervis primariis utrinque 9–12, distantibus, curvatis, subtus elevatis, perspicuis, arcuato-anastomosantibus; inflorescentiis oppositifoliis, uncatis, ligneis, pubescentibus, 1-floris; floribus flavidis, pedicellis circiter 8 mm. longis, pubescentibus, sursum incrassatis; sepalis ovatis, acuminatis, 4.5–5 mm. longis, coriaceis, extus pubescentibus, intus subglabris vel leviter pubescentibus; petalis crassissime coriaceis, utrinque dense breviter subcinereo-pubescentibus, exterioribus 2 cm. longis, oblongo-lanceolatis, obtusis, planis, 6 mm. latis, basi cupulatis, intus glabris, petalis interioribus minoribus, subteretibus vel leviter compressis, ad 2 mm. crassis, rectis vel leviter curvatis, partibus basalibus planis, intus glabris, extus ad basin partibus liberis distincte subauriculatis; staminibus numerosis, 2 mm. longis, deorsum angustatis, connectivo circiter 1 mm. diametro, subtruncato-convexo; carpellis circiter 6, oblongo-ovoideis, densissime adpresse hirsutis; stylis crassis, 1 mm. longis, glabris, subteretibus.

INDO-CHINA, Tonkin, Bac Giang Province, near Pho Vi, *Pételot 4857*, June 1933, a large vine with yellow flowers, in forests.

The alliance of this species is clearly with *Artabotrys uniflorus* (Griff.) Craib, Kew Bull. 435. 1915, described and well illustrated by King, Ann. Bot. Gard. Calcutta **4**: 47. *t.* 62. 1893 as *A. burmanicus* (non A. DC.!), one of the few species in this alliance that has densely hirsute ovaries. It differs in its somewhat smaller flowers, relatively broader outer petals and relatively narrower, almost terete, inner ones, and its bluntly, rather than acutely acuminate leaves, the main nerves interarching once within the margins, not twice as in Griffith's species. Gagnepain gives a very brief description of *A. burmanicus* A. DC. on the basis of *Pierre 104* from Siam, a fruiting specimen, giving its range as "Toute la Presqu'île Malaise." Ridley does not admit the species in his Flora of the Malay Peninsula, and

Craib, Fl. Siam. Enum. 1: 33. 1925, states that Gagnepain's description does not apply to *Artabotrys burmanicus* A. DC., but that it suggests *A. siamensis* Miq., and does not admit the former as definitely occurring in Siam. *A. burmanicus* A. DC. is a species quite distinct from *A. uniflorus* (Griff.) Craib.

***Desmos monogynus* sp. nov.**

Frutex 5–6 m. altus, perspicue subcastaneo-villosus, ramis vetustioribus glabris, ramulis dense villosis, circiter 2 mm. diametro; foliis oblongis, chartaceis, 11–17 cm. longis, 3.5–6 cm. latis, in sicco supra pallidis, glabris, subtus subcastaneo-brunneis, praesertim secus costam nervosque dense villosis, apice breviter acuminatis, basi rotundatis et minute cordatis; nervis primariis utrinque 13–15, supra haud distinctis, subtus elevatis, perspicuis, circiter ad marginem arcuato-anastomosantibus; petiolo dense villosus, crasso, 3–4 mm. longo; floribus axillaribus, solitariis, brevissime pedicellatis; sepalis triangulari-ovatis, obtusis, circiter 6 mm. longis et 5 mm. latis, intus glabris, extus adpresse hirsutis, margine ciliatis; petalis lanceolatis circiter 3 cm. longis, extus adpresse villosis, intus glabris, exterioribus 8 mm., interioribus 10 mm. latis, sursum angustatis, obtusis; staminibus numerosis, cuneatis, 2 mm. longis, connectivo obliquo, truncato, cellulis extrorsis; carpellis solitariis, oblongis, 3 mm. longis, plus minusve compressis, adpresse hirsutis, sursum leviter angustatis; stigmatibus sessilibus, depresso-globosis, leviter hirsutis; ovulis 2-seriatis, numerosis; fructibus dense subcastaneo-pubescentibus, ad 6 cm. longis et 2 cm. diametro, seminibus 2, inter se leviter constrictis.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2597, Aug. 28, 1940, in open humid forests, alt. 200 m.

This species is somewhat anomalous in the Annonaceae in its monocarpellate flowers, although occasionally one finds species in various genera with single carpels, and is likewise anomalous within the genus *Desmos* Lour. (*Unona* auctt. non Linn.) not only in this character but also in its sessile depressed-globose, somewhat hairy stigmas, and much thickened fruits which are only slightly constricted between the two seeds. While it seems probable that ultimately it may be desirable to establish a new genus for this rather striking form, in view of the slight amount of material available (a single flower dissected) it seems best to place it in *Desmos* for the present. It is not closely allied to any previously described species in this group.

***Fissistigma villosissimum* sp. nov.**

Frutex ut videtur scandens, ramulis et floribus et subtus foliis densissime molliter villosis; ramis teretibus, vetustioribus subatris, lenticellatis, glabris vel glabrescentibus, ramulis circiter 2 mm. diametro, densissime ferrugineo-vel subcinereo-villosis; foliis coriaceis, oblongis vel oblongo-ellipticis, 10–16 cm. longis, 3.5–6 cm. latis; brevissime subabrupte acute acuminatis basi late rotundatis vel leviter cordatis, supra laevibus, olivaceis, subnitidis, glabris vel junioribus secus costam perspicue ferrugineo-pubescentibus, subtus densissime uniformiter villosis, pilis elongatis, subadpressis, ferrugineis vel badio-ferrugineis; nervis primariis utrinque circiter 20, supra gracilibus, haud impressis, subtus elevatis, perspicuis, rectis vel leviter curvatis, ad

marginem distincte curvatis sed vix anastomosantibus; petiolo 6–10 mm. longo, densissime villosa vel vetustiori glabrescenti; floribus solitariis vel binis, in axillis superioribus, subsessilibus, circiter 2 cm. longis; sepalis liberis vel subliberis, oblongo-ovatis, crasse coriaceis, intus verruculosus, glabris, extus densissime badio-villosis, 10–12 mm. longis, deorsum 7 mm. latis, sursum angustatis, acutis; petalis crasse coriaceis, exterioribus oblongo-ovatis, 2 cm. longis, 1 cm. latis, sursum angustatis, obtusis, intus verruculosus, glabris vel sursum ad marginem cinereo-puberulis, extus densissime longe subadpresse subbadio-villosis, petalis interioribus oblongo-lanceolatis, 1.5 cm. longis et 7 mm. latis, crassissime coriaceis, sursum angustatis, obtusis, extus in partibus medianis adpresse puberulis ceteroquin glabris, intus ad basim excavatis, verruculosus, sursum crassissimis, valvatis; staminibus numerosis, 2–2.4 mm. longis, plus minusve oblanceolatis, cellulis contiguis, connectivo ovoideo, acuto vel obtuso, 0.8–1 mm. longo, quam partibus celluliferis latioribus; carpellis circiter 20, cum stylis 3.5–4 mm. longis, ovario oblongo, densissime adpresse subferrugineo-villoso, pilis 1–2 mm. longis; stylis glabris oblongis, crassis, 1.5 mm. longis, truncatis vel subtruncatis interdum minute denticulatis, stigmatibus haud distinctis, glabris; ovulis circiter 8, 2-seriatis.

INDO-CHINA, Tonkin, Thoi Nguyen Province, Phan Mê, *Pételot* 2683, Nov. 12, 1939.

The alliance of this species is clearly with the Hainan-Tonkin *Fissistigma Maclurei* Merr. (*Melodorum Maclurei* Ast) and **F. villosum** (Ast) comb. nov. (*Melodorum villosum* Ast in Lecomte, Fl. Gén. Indo-Chine Suppl. I: 110, 1938), the latter based on a single *Poilane* collection from Blao, Annam. It differs from the former notably in its sessile or nearly sessile flowers, more numerous primary nerves, longer petioles, and shortly acuminate, not obtuse leaves, and from the latter in its larger leaves, much more copious ferrugineous indumentum, and larger flowers, being apparently more closely allied to the latter than to the former.

MYRISTICACEAE

Knema Petelotii sp. nov.

Arbor parva, ramis ramulisque teretibus, ramis glabris vel subglabris, ramulis ultimis circiter 1.5 mm. diametro, obscure longitudinaliter striatis, subdense breviter substellato-subfurfuraceis, pallide brunneis; foliis firmiter membranaceis vel chartaceis, oblongis vel oblongo-oblanceolatis, 9–22 cm. longis, 2.5–5.5 cm. latis, distincte acute acuminatis, basi late acutis, supra glabris, in sicco olivaceis, opacis vel subnitidis, nervulis et reticulis ultimis gracilibus sed manifestis, leviter elevatis, subtus glaucis praesertim secus costam nervosque minute substellato-subfurfuraceis glabrescentibus; nervis primariis utrinque 12–18, subtus elevatis, perspicuis, secus marginem arcuato-anastomosantibus; petiolo 5–10 mm. longo, dense breviter subgranuloso-pubescente; inflorescentiis ♂ axillaribus, solitariis, umbellatis, 3–5-floris, pedunculis 3–5 mm. longis, cum pedicellis 5–6 mm. longis dense breviter pallide brunneo-pubescentibus, indumento substellato vel substellato-subfurfuraceo; bracteolis in partibus $\frac{2}{3}$ vel $\frac{3}{4}$ superioribus subreniformibus, late rotundatis, circiter 1 mm. longis; perianthio 5–6 mm. longo, inaperto 3–4 mm. diametro, extus dense breviter pubescente, tubo circiter 3 mm. longo, intus glabro, lobis 3, late ovatis, tubo aequantibus, subobtusis vel late acutis, intus glabris; alabastro obovoideo, androphoro

3 mm. longo, glabro, stipite sursum leviter incrassato, apicem cum antheris circiter 2 mm. diametro, convexo; antheris 10, sessilibus, 1 mm. longis.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot 6608*, in open humid forests.

This is clearly distinct from any of the five species admitted by Lecomte as occurring in Indo-China. It is characterized by its relatively thin leaves which are glaucous beneath, its short substellate-subfurfuraceous indumentum on the inflorescences and younger parts, and by its few-flowered, simple staminate umbels. In accordance with Warburg's arrangement of the species it apparently belongs in the group with *Kncma Pierrei* Warb. which has much larger, more numerous nerved leaves.

HERNANDIACEAE

Illigera Petelotii sp. nov. § *Appendiculatae* ?

Frutex scandens, plus minusve pubescens, caulibus in sicco subcastaneis, longitudinaliter sulcatis, leviter pubescentibus glabrescentibus, ramulis ultimis teretibus, 1.5–2 mm. diametro, parce pubescentibus; foliis 3-foliolatis, petiolo 7–9 cm. longo, leviter pubescenti, axillis plerumque alabastra ferrugineo-pubescentia gerentibus; foliolis subcoriaceis vel junioribus submembranaceis, ellipticis anguste ovato-ellipticis vel leviter obovato-ellipticis, breviter obtuse acuminatis, basi leviter cordatis, 8–12 cm. longis, 5–7 cm. latis, supra glabris vel ad costam nervosque breviter pubescentibus, in sicco olivaceo-brunneis, subnitidis, subtus paullo pallidioribus, breviter molli-terque subconspere pubescentibus, nervis lateralibus utrinque 4, curvato-adscendentibus, arcuato-anastomosantibus, subtus distinctis, elevatis, reticulis primariis gracilibus, distinctis; petiolulis breviter pubescentibus, 1.2–1.5 cm. longis; inflorescentiis terminalibus, laxis, amplis, ad 25 cm. longis, ramis paucis, 10–15 cm. longis, breviter pubescentibus; floribus (ut videtur paucis) ignotis, bracteis oblongo-ellipticis, utrinque pubescentibus, 2–3 mm. longis; fructibus maturis (cum alis) 4–5 cm. latis, 2.5 cm. longis, apice distincte retusis, leviter pubescentibus, late bialatis et inter alas latiores anguste bicarinatis, alis latissime rotundatis, glabris vel subglabris.

INDO-CHINA, Bac Giang Province, between Kep and Pho Vi, *Pételot 2476*, February 27, 1936, borders of the forest.

Although the flowers of this species are as yet unknown, it is suspected that it belongs in Dunn's section *Appendiculatae* because of its general resemblance to *Illigera Pierrei* Gagnep. It differs from Gagnepain's species, of which an isotype is available, in its leaves being softly pubescent beneath, those of *I. Pierrei* Gagnep. being glabrous except for the indumentum in the axils and along the midrib below on the lower surface, the differences in the fruits being even more striking. In *Pierre 1950, 1956* from Baochiang and Mokay, Bienhoa Province, the fruit wings are 3 to 4 cm. long and 2 to 3.5 cm. wide, and elliptic in outline; in *Pételot 2476* they are sub-orbicular and 2.5 cm. long and wide.

Illigera mollissima W. W. Sm. Notes Bot. Gard. Edinb. **10**: 42. 1917.

Illigera cordata Dunn, Jour. Linn. Soc. Bot. **38**: 296. 1908, pro minore parte, *quoad Hancock 538* et "foliolis suborbicularibus — ubique molliter pubescentibus."

Dunn's species was based on two different entities, *Hancock 538* clearly

being the same as *Illigera mollissima* W. W. Sm.; the three Henry numbers cited by him are retained as representing *I. cordata* Dunn as apparently Dr. Smith interpreted Dunn's species from the Henry material when he described *Illigera mollissima* W. W. Sm. Any other interpretation would involve the acceptance of *Illigera cordata* Dunn as appertaining to the species with softly pubescent suborbicular leaves, the reduction of *I. mollissima* W. W. Sm. to synonymy, and the description of *Henry 9902, 9902A, 10649* (specimens of all of which are before me) as a new species. *Illigera mollissima* W. W. Sm., as thus interpreted, is represented in the herbarium of the Arnold Arboretum by the following specimens: Szechuan, *Forrest 21403*; Yunnan, *Delavay 3600* and two sheets *s.n.* (distributed as *I. cordata* Dunn), *R. C. Ching 20217*, April 25, 1939.

Illigera cordata Dunn, Jour. Linn. Soc. Bot. **38**: 296. 1908.

To "save" this name, as explained above, and to "save" *Illigera mollissima* W. W. Sm., I restrict Dunn's species to the cited *Henry* specimens, *9902, 9902A, 10649*, referring *Hancock 538* to *Illigera mollissima* W. W. Sm. The species, as thus restricted is further represented by *Maire s.n.* from Yunnan and *Wilson 4091* from "western China." To be eliminated from the original description "foliolis suborbicularibus - - - ubique molliter pubescentibus"; the leaflets are ovate to oblong-ovate, acuminate, slightly but distinctly cordate, sparingly short-pubescent becoming subglabrous, and on the three *Henry* specimens examined are but 5 to 8 cm. long. The mature fruits on *Henry 9902* are 2 cm. long and 3 to 3.5 cm. wide (including the wings) and the description of *Illigera cordata* Dunn should thus be changed from "fructus - - - 3-5 cm. latus" to "3-3.5 cm. latus."

Illigera yaoshanensis Hao, Repert. Sp. Nov. **42**: 84. 1937.

This species, described from fruiting specimens from Kwangsi (*Sin 1536, 3536*) and Hainan (*Henry 8564*), should be compared with *Illigera platyandra* Dunn, as it seems, from the description, to be very similar to the latter rather than to *I. mollissima* W. W. Smith, to which it was compared. In the description "petiolis 10-20 mm. longis" must be an error for the petiolules. I think that *Tsang 23288* from Tou Ngok Shan, Kwangsi, near the Kwangtung border, represents Hao's species, and if so, then it would seem to be clear that his species should be reduced to *I. platyandra* Dunn.

CAPPARIDACEAE

Capparis Petelotii sp. nov.

Frutex glaber, circiter 2.5 m. altus, inermis (saltem in partibus superioribus), ramis teretibus, ultimis circiter 3 mm. diametro; foliis chartaceis, oblongo-ellipticis, 20-35 cm. longis, 7-12 cm. latis, basi rotundatis vel late acutis, apice apiculato-acuminatis, in sicco pallide viridibus, supra nitidis, subtus paullo pallidioribus; nervis primariis utrinque circiter 12, distantibus, curvatis, subtus valde perspicuis, elevatis, arcuato-anastomosantibus, secundariis reticulisque primariis laxis elevatis perspicuis; petiolo circiter 1.5 cm. longo; floribus supra-axillaribus, plerumque 4, 1-seriatim dispositis, pedicellis glabris, sursum plus minusve incrassatis, ad 1.8 cm. longis; sepalis lanceolatis vel elliptico-lanceolatis, acuminatis, circiter 12 mm. longis et

4 mm. latis, extus glabris, intus minutissime puberulis; petalis late oblanceolatis, circiter 2 cm. longis et 6–7 mm. latis, rotundatis vel obtusis, extus glabris, intus purpureis et deorsum obscure pubescentibus; filamentis glabris, ad 3 cm. longis, filiformibus; antheris oblongis, 2 mm. longis; gynophoro glabro, 3 cm. longo; ovario oblongo-ovoideo, glabro, 3 mm. longo, placentis 4, ovulis numerosis; stylo crasso, 1 mm. longo, stigmatibus 1 mm. diametro.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2618, July 2, 1940, a shrub about 2.5 m. high, alt. 600 m.

A species in the group with *C. horrida* Linn. and *C. micracantha* DC., characterized by the flowers being superimposed in a line above the axils, and in this group most closely allied to *Capparis donnaiensis* Pierre, from which it differs in its much larger, thinner leaves, somewhat fewer lateral nerves, larger flowers and nearly glabrous petals and sepals, these being only obscurely and shortly pubescent within, quite glabrous outside.

Capparis yunnanensis Craib & W. W. Sm. Notes Bot. Gard. Edinb. **9**: 91. 1916.

INDO-CHINA, Tonkin, Chapa, *Pételot* 5951, April 1936, a large liana along mountain streams, alt. 1200 m. Yunnan.

When first studied, this was indicated by me as an undescribed species, and although it differs slightly from *Henry* 12986, the type of the species, in its shorter inflorescences, I am now convinced that the Chapa material should be referred to this Yunnan form.

SAXIFRAGACEAE

Hydrangea indochinensis sp. nov. § *Euhydrangea*, *Petalanthae*.

Frutex, inflorescentiis exceptis glaber vel subglaber; ramis teretibus, glabris, laevibus, in sicco subatro-viridibus, junioribus brunneis, ultimis circiter 1 mm. diametro; foliis lanceolatis vel oblongo-lanceolatis, 7–11 cm. longis, 2–3 cm. latis, graciliter acuminatis, basi acutis vel cuneatis, submembranaceis, in sicco supra olivaceis, subtus pallidioribus, utrinque glabris vel junioribus subtus obscure conspersissime breviter pubescentibus, margine plerumque revolutis, obscure subcalloso-denticulatis vel deorsum integris, dentibus minutis, 1–3 mm. distantibus; nervis primariis utrinque circiter 7, gracilibus, distinctis, curvato-adscendentibus, circiter ad marginem obscure arcuato-anastomosantibus; petiolo glabro, 1–2 cm. longo; inflorescentiis terminalibus, pedunculatis, breviter, subadpresse substrigoso-hirsutis, pedunculo circiter 4 cm. longo, ramis primariis pedunculum subaequantibus, subpatulis, sub fructu (sine radiis sterilibus) ad 9 cm. latis, pedicellis 3–5 mm. longis; capsulis ovoideis, circiter 4 mm. longis, additis stylis persistentibus 3–5 (plerumque 4) 2–2.5 mm. longis, extus leviter 8-costatis, subrefractis, glabris vel praesertim deorsum conspersissime subadpresse hirsutis, in vivo ut videtur subazureis; calycis lobis persistentibus 5, oblongis, obtusis, suberectis, 0.5 mm. longis; ovario sub fructu plane infero vel apici leviter protruso; seminibus pallidis, oblongo-ellipsoideis, utrinque subattenuatis, utrinque subacutis vel apice subacuminatis, vix vel obscure alatis, longitudinaliter striatis, circiter 1 mm. longis; radiis sterilibus circiter 5, elongatis, ad 5 cm. longis sub medio saepe flores 1–3 fertiles ferentibus; floribus sterilibus sub fructu 4-meris, albidis, circiter 4 cm. diametro, sepalis suborbiculari-ovatis vel suborbiculari-obovatis, integris,

rotundatis, basi late acutis, chartaceis vel submembranaceis, 1.5–2 cm. longis, 1.2–1.8 cm. latis, subperspicue longitudinaliter 7-costatis, reticulatis, utrinque, praesertim deorsum, secus nervos conspersissime breviter hirsutis.

INDO-CHINA, Tonkin, Chapa, Massif de Fan Tsi Pan, *Pételot* 2687, July 1940, in humid ravines, alt. 2200 m.

This is the second species of the genus to be recorded from Indo-China. It is characterized by its thin leaves, by being entirely glabrous except the inflorescences, by its inferior ovaries, apparently somewhat nodding capsules, and greatly elongated sterile rays, each bearing a single sterile flower, and about half way along the peduncle 1 to 3 fertile flowers. In spite of its distinctly superior ovaries, it clearly belongs in the group with *Hydrangea chinensis* Maxim., and its closest described ally may be *Hydrangea kwangsiensis* Hu, Jour. Arnold Arb. **12**: 152. 1931, Ic. Pl. Sin. **3**: 35. t. 135. 1933.

ROSACEAE

***Pygeum affine* sp. nov. § *Cylopygeum*.**

Species *P. ciliato* Koehne simillima et affinis, differt foliis tenuioribus, glandulis basalibus nullis vel, si praesentibus, planis, obscurissimis, nullo modo marsupialibus, nervis reticulisque supra haud impressis, antheris vix 0.5 mm. longis. Arbor circiter 12 m. alta, ramis teretibus, subatris, consperse lenticellatis, glabris vel junioribus decidue subferrugineo-pubescentibus, ramulis ultimis dense subferrugineo-villosis, circiter 1.5 mm. diametro; foliis chartaceis, ellipticis vel late oblongo-ellipticis, 11–16 cm. longis, 5–7.5 cm. latis, breviter subobtusely acuminatis, basi plerumque rotundatis, in sicco brunneis vel pallide olivaceo-brunneis, subtus pallidioribus, supra ad costam nervosque subferrugineo-pubescentibus, ceteroquin glabris vel in parenchymate pilos paucos breves conspersissimos ferentibus, subtus ad costam nervosque sat conspicue breviter ferrugineo-pubescentibus, in parenchymate conspersissime pubescentibus glabrescentibus, margine planis vel minute revolutis si revolutis minute multiseriatim breviter ciliatis; nervis primariis utrinque 8–9, supra planis, subtus elevatis, perspicuis, arcuato-anastomosantibus, reticulis primariis gracilibus, distinctis, leviter elevatis; petiolo dense ferrugineo-pubescenti, 6–10 mm. longo; stipulis caducis (haud visis); inflorescentiis dense ferrugineo-pubescentibus, racemis 3–5-fasciculatis, vel rariter paniculatis, 4–6 cm. longis, plerumque in axillis defoliatis in ramis annotinis; pedicellis 1.5–3 mm. longis, bracteolis oblanceolatis, 1.5 mm. longis, extus dense pubescentibus, intus glabris, caducis; calycibus subcupulatis, extus ferrugineo-pubescentibus, intus, basi exceptis, glabris, deorsum plus minusve angustatis, 3 mm. longis, segmentis 10, 5 (sepalis), triangulari-ovatis, acutis, pubescentibus, 1 mm. longis, 5 alternis (petalis) aequilongis, anguste obovatis, obtusis vel rotundatis; staminibus circiter 30, filamentis glabris, 1.5–3 mm. longis; antheris 0.5 mm. longis; ovario ovoideo, circiter 1.2 mm. longo, deorsum ferrugineo-villoso, sursum pilos sparsos ferente; stylis 2.5–3 mm. longis; fructibus ignotis.

INDO-CHINA, Tonkin, Chapa, *Pételot* 6160 (TYPE), 6161, August 1930 and August 1935, in forests, alt. about 1500 m.

The alliance of this species is clear, but Koehne's sections are in part based on very slight characters. The only other described species, *Pygeum ciliatum* Koehne, to which this might be closely allied is *Pygeum arboreum*

"Kurz" (accredited by Kurz to Endlicher), but as Koehne notes, this specific name cannot be retained as it was based on *Polydontia arborea* Blume (see Jour. As. Soc. Bengal **45**(2): 303. 1876) and Blume's species was based on a mixture, including *Pygeum latifolium* Miq., *P. griseum* Blume, *P. parviflorum* Teysm. & Binn., and *P. Blumei* Koehne, as interpreted by Koehne. In *Pygeum affine* Merr. the basal glands are usually absent, or if present, then a single one, and this obscure and plane, not at all saccate. The inflorescences are mostly racemes, but occasionally there are one or two lateral branches as much as 2.5 cm. long.

Pygeum brachybotrys sp. nov. § *Cylopygeum* ?

Arbor, ramis teretibus, in sicco nigris, glabris, conspersissime lenticellatis, ramulis junioribus circiter 1.5 mm. diametro, dense breviter ferrugineo-pubescentibus; foliis chartaceo-coriaceis, oblongo-ovatis, integris, 5-7 cm. longis, 3-3.5 cm. latis, breviter acute acuminatis, basi late acutis vel subrotundatis, margine obscurissime revolutis, breviter ciliatis, supra olivaceis, glabris, nitidis vel junioribus opacis et praesertim secus costam plus minusve pubescentibus, subtus brunneis, uniformiter subadpresse breviter villosis, glandulis basalibus nullis, vel cum adsint singularibus subtus tantum manifestis, subconcavis haud saccatis, circiter 1 mm. diametro; nervis primariis utrinque 7, supra (in foliis vetustioribus) cum reticulis leviter impressis, subtus elevatis, perspicuis, curvato-adscendentibus, haud vel secus marginem obscurissime arcuato-anastomosantibus; petiolo 5-7 mm. longo, breviter villosa vel vetustis glabro; stipulis caducis (haud visis); inflorescentiis brevibus, ferrugineo-villosis, 1-2 cm. longis, racemis 3-5-fasciculatis, in axillis defoliatis (in ramis annotinis) rariter in axillis foliorum, bracteolis non visis; floribus breviter (1-1.5 mm.) pedicellatis vel alabastris sessilibus vel subsessilibus; calycis tubo cupulato, 2 mm. longo, extus subferrugineo-pubescenti, segmentis 10, omnibus simillimis, 0.5-0.8 mm. longis, pubescentibus, obtusis vel subacutis; staminibus circiter 20, filamentis glabris, 1-2.5 mm. longis; antheris vix 0.5 mm. longis; ovario glaberrimo, oblongo-ovoideo, circiter 1 mm. longo; stylis glabris, 1.3-2 mm. longis; fructibus ignotis.

INDO-CHINA, Tonkin, Xoan Dao, Pho Ba Che, *Pételot* 4029 (TYPE).

A species characterized by its small leaves, the basal glands normally absent, but if present, then a single one clearly evident on the lower surface and slightly concave but not at all saccate, and its unusually short inflorescences and small flowers. While I have tentatively placed it in the section *Cylopygeum* I am by no means convinced that it belongs here, but in the absence of fruits nothing further can be done with it at present. With the description of these two new species the total number of Indo-China species is now five.

LEGUMINOSAE

Apios carnea (Wall.) Benth. ex Baker in Hook. f. Fl. Brit. Ind. **2**: 188. 1876; Gagnepain in Lecomte, Fl. Gén. Indo-Chine **2**: 421. f. 40, 6-8. 1916; Hand.-Maz. Symb. Sin. **7**: 579. 1933; Chun, Sunyatsenia **4**: 217. 1940.

Cyrtotropis carnea Wall. Pl. As. Rar. **1**: 50. t. 62. 1830.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2470, Aug. 1940, a large liana, alt. 1500 m. India to Siam, Yunnan, and fide Chun, in Kwangtung.

The only reason for recording this here is that although Gagnepain described it, *l.c.*, he had seen no Indo-Chinese specimens, admitting the species because it occurs in Siam. The Chinese *Apios macrantha* Oliv. Hook. Ic. **20**: t. 1946, 1890, originally described from Szechuan, is allied but is apparently distinct.

Desmodium triangulare (Retz.) comb. nov.

Hedysarum triangulare Retz. Obs. **3**: 40. 1783.

Hedysarum cephalotes Roxb. Hort. Beng. 57. 1814, *nomen nudum*, Fl. Ind. ed. 2, **3**: 360. 1832.

Desmodium cephalotes Loud. Hort. Brit. 310. 1830, *nomen nudum*, Wall. List no. 5721. 1832; Gagnep. in Lecomte, Fl. Gén. Indo-Chine **2**: 573. 1920.

Dendrolobium triangulare Schindl. Repert. Sp. Nov. **20**: 279. 1824.

Retzius' specific name is the oldest one for this widely distributed Asiatic species, whether it be retained in *Desmodium* or placed in the generic segregate *Dendrolobium* where Schindler disposes of it.

Bauhinia bracteata Grah. ex Baker in Hook. f. Fl. Brit. Ind. **2**: 282. 1878; Craib, Fl. Siam. Enum. **1**: 517. 1928; Gagnep. in Lecomte, Fl. Gén. Indo-Chine **2**: 149. 1913.

Bauhinia unguiculata Baker, op. cit. 277; Gagnep. op. cit. 150.

Bauhinia Harmandiana Pierre ex Gagnep. Not. Syst. **2**: 172. 1912; Lecomte, Fl. Gén. Indo-Chine **2**: 128. 1913.

Craib's investigation of the confusion that has existed in reference to the status of *Bauhinia bracteata* Grah., *B. Helferi* Craib, and *B. unguiculata* Baker results in the reduction of the Indo-Chinese list of *Bauhinia* by two species; see his note, Kew Bull. **1924**: 93. 1924, sub *B. Helferi* Craib, *in nota*. Siam and Indo-China.

Bauhinia coccinea (Lour.) DC. Prodr. **2**: 516. 1825; Merr. Trans. Am. Philos. Soc. II. **24**(2): 188. 1935.

Phanera coccinea Lour. Fl. Cochinch. 37. 1790, ed. 2, 47. 1793; Moore, Jour. Bot. **63**: 247. 1925.

INDO-CHINA, Annam, Mount Bana, Clemens 4254, May-July 1927, a great liana covering the highest trees with a mass of unusually large brilliant red flowers.

This is a most remarkable species with unusually large flowers, about 13 cm. in diameter, entirely different from any of the forms admitted by Gagnepain, but an Indo-Chinese species overlooked by him, falling in his section I (ovaries pubescent, *not glabrous*). The conspicuous lateral appendages to the claws of the standard are more or less lacerate and up to 1 cm. long along the upper $\frac{1}{2}$ to $\frac{2}{3}$ of the claw. The long stipitate ovaries and the styles are densely appressed pubescent with short, shining brownish-red hairs. The sepals are linear-lanceolate or narrowly strap shaped, 3–3.5 cm. long, 3 mm. wide, sharply acute or slightly acuminate, appressed pubescent outside. The calyx tube, in bud, is 1.5 cm. long, 2–3 mm. wide, slightly sulcate, pubescent, the bud excluding the tube, cylindric, 3 cm. long, about 8 mm. in diameter. This most striking species is the type of the subgenus *Phanera* and is at present known only from the original collection made in the latter part of the eighteenth century and the Clemens collection of 1927.

Bauhinia tenuiflora Watt ex C. B. Clarke, Jour. Linn. Soc. Bot. **25**: 18. t. 6. 1889.

Bauhinia caterviflora Chen, Jour. Arnold Arb. **19**: 129. 1938, Lingnan Sci. Jour. **18**: 479. 1939; Merr. Jour. Arnold Arb. **21**: 368. 1940.

Chen's species was credited to Indo-China in 1940 on the basis of *Pételot* 2165 from Chapa, but it has since transpired that *B. caterviiflora* Chen is identical with the much older *B. tenuiflora* Watt, originally described from Munnepore. The species extends from Burma to Siam, northern Indo-China, and Yunnan.

***Bauhinia carcinophylla* sp. nov. § *Phanera*.**

Frutex scandens, ramulis petiolis inflorescentiis et foliis subtus perspicue subadpresse castaneo- vel rubiginoso-subferrugineo-pubescentibus, vel in foliis vetustioribus indumento pallide cinereis, ramis teretibus, laevibus, glabris, ramulis ultimis circiter 2 mm. diametro, dense subadpresse villosis; foliis fere ad basim fissis vel lobis tota liberis, coriaceis, basi distincte cordatis, 10–12-nerviis, supra glabris, olivaceis vel atro-olivaceis, minute subdense reticulatis, subtus uniformiter breviter subadpresse pubescentibus, lobis vel foliolis 6–10 cm. longis, 2.5–4 cm. latis, omnino liberis vel deorsum breviter (2–6 mm) connatis, inaequilateraliter oblongis, fere semilunaribus, obtuse acuminatis, falcatis, leviter incurvatis, apices saepe attingentibus vel imbriatis; petiolo 1.5–5 cm. longo, dense villosa; inflorescentiis terminalibus, dense subrubiginoso-villosis, brevibus, simpliciter racemosis, haud corymbosis, 6–8 cm. longis, ad 5–6 cm. latis, axibus abbreviatis (2–5 cm. longis), floribus plus minusve confertis; pedicellis 1–1.5 cm. longis, bracteis lanceolatis, acuminatis, 5 mm. longis, bracteolis ad basim calycis tubi linearibus, 4–5 mm. longis, deciduis; calycis tubo cylindraco, circiter 6 mm. longo, 3.5 mm. diametro, basi acuto, cum lobis extus dense adpresse subrubiginoso-villoso, lobis 5, reflexis, oblongis vel oblongo-ellipticis, acuminatis, intus glabris, circiter 1 cm. longis et 4 mm. latis; petalis vix unguiculatis sed deorsum angustatis, obovatis vel oblongo-obovatis, rotundatis, basi acutis, intus glabris, extus dense adpresse subrubiginoso- vel ferrugineo-villosis, ad 1.8 cm. longis et 1 cm. latis; staminibus fertilibus 3, filamentis sursum glabris, deorsum villosis, circiter 12 mm. longis; antheris oblongis, 5 mm. longis; ovario oblanceolato, circiter 8 cm. longo, dense ferrugineo-villoso, stylo ad 15 mm. longo, deorsum plus minusve subadpresse villosa supra medium glabro; leguminibus (valde immaturis) dense villosis.

INDO-CHINA, Tonkin, Tsai Wong Mo Shan and Sai Wong Mo Shan (Sai Vong Mo Leng), in the extreme northeastern part of Indo-China just south of the juncture of the Kwangtung-Kwangsi-Tonkin boundaries, *W. T. Tsang* 29033 (TYPE), 29878, May 11–20, 1939, and May-Dec. 1940, in thickets, flowers white, fragrant.

This is a remarkably distinct species, falling in Gagnepain's section I (ovaries pubescent, *not glabrous*, as indicated by him in his key), but differing from all of the 21 species placed by him in this group by the leaves being divided almost or quite to the base, the sinuses normally very narrow, the somewhat incurved apical parts of the lobes or leaflets often touching or overlapping, somewhat suggesting the claws of a crab. The short, crowded, simple racemes are also characteristic, for most of the species in this group have corymbose inflorescences. The apical parts of the buds are ellipsoid and about 1 cm. long, exceeding the calyx tubes in length.

***Bauhinia Clemensiorum* sp. nov. § *Phanera*.**

Frutex scandens, ramulis inflorescentiis et petiolis et foliis subtus insigniter rubiginoso-villosis, ramis vetustioribus glabrescentibus; foliis subcoriaceis, integris, breviter petiolatis, ovatis, 5–7 cm. longis, 3.5–7.5 cm. latis,

basi late rotundatis vel leviter cordatis, 9-nerviis, apice late rotundatis plerumque brevissime apiculatis, supra in sicco subcastaneo-olivaceis, parcissime villosis glabrescentibus, subtus rubiginosis atque perspicue rubiginoso-villosis, nervis elevatis, distinctis; petiolo dense rubiginoso-villoso, 8–10 mm. longo; cirrhis circiter 5 cm. longis, dense rubiginoso-villosis; inflorescentiis stricte racemosis, racemis solitariis vel binis, 6–10 cm. longis, dense rubiginoso-villosis, breviter pedunculatis, pedicellis post anthesin persistentibus numerosissimis, confertis, 1.2–1.5 cm. longis, sub fructu plerumque deciduis, rhachibus nunc cicatrices ca. 3 mm. diametro elevatas perspicuas ferentibus; bracteis lineari-filiformibus, 6–8 mm. longis, pedicellis binis bracteolas simillimas supra medium ferentibus; calycis tubo cylindrico vel subcompresso circiter 2 cm. longo, 1.5–2 mm. lato, dense adpresse pubescenti; calycis lobis 5, liberis, reflexis, oblongo-lanceolatis, acuminatis, 7 mm. longis, 3 mm. latis, intus glabris, extus dense rubiginoso-pubescentibus; petalis suborbicularibus, roseis, utrinque late rotundatis vel apice plus minusve retusis, haud unguiculatis, intus glabris, extus praesertim in partibus medianis parce rubiginoso-villosis, pilis adpressis; staminibus fertilibus 3; antheris oblongo-ellipsoideis, 3 mm. longis; staminodeis 7, glabris, 2.5–3 mm. longis; ovario glabro, in alabastro sessili demum distincte stipitato; fructibus glaberrimis, planis, castaneis, nitidis, glabris, leviter reticulatis, rectis vel leviter curvatis, loriformibus, 4–4.5 cm. latis, 20 cm. longis, pedicellis cum stipitibus 5 cm. longis.

INDO-CHINA, Annam, general vicinity of Hué and of Tourane, *J. & M. S. Clemens* 3621 (TYPE), 3229, July 3 (flower) Aug. 3 (fruit) 1927, a luxuriant vine along forest margins, flowers pink-red.

A remarkably distinct species, falling in Gagnepain's group II (ovaries *glabrous*, not pubescent, in this group), but entirely different from the other species in this assemblage. Striking characters, other than its rubiginous indumentum, are its entire, not lobed leaves, short petioles, dense racemes, the few racemes not arranged in panicles, the pedicels persisting for a time after the flowers fall, but when the fruits are mature nearly all the pedicels have fallen, leaving very prominent projecting scars on the somewhat thickened rachis.

***Bauhinia melanophylla* sp. nov. § *Phanera*.**

Frutex scandens, ut videtur altus, ramis glabris, teretibus, in sicco atris, junioribus parcissime pubescentibus glabrescentibus; foliis membranaceo-chartaceis, in sicco atris, utrinque nitidis, in ambitu suborbicularibus, 7–12 cm. longis latisque, basi perspicue cordatis, 11-nerviis, lobis late rotundatis, apice breviter lobatis, lobis 2–2.5 cm. longis e basi latissimis sursum angustatis, acute acuminatis, supra glabris, subtus ad basim parce adpresse ciliatis glabrescentibus; petiolo 3.5–5 cm. longo, parcissime adpresse-hirsuto glabrescenti; inflorescentiis terminalibus racemis circiter 6 elongatis pedunculatis paniculam formantibus, pedunculis 7–9 cm. longis, glabris vel glabrescentibus, cirrhis ad 10 cm. longis, partibus floriferis 10–20 cm. longis, subdense adpresse sordide cinereo-pubescentibus, pedicellis circiter 1 cm. longis, dense adpresse pubescentibus, vel superioribus (alabastris) brevioribus, bracteis lanceolatis, acuminatis, 3–4 mm. longis, bracteolis vix 1 mm. longis; floribus sub anthesin 3–3.5 cm. diametro, alabastris obovoideis, late rotundatis, dense, breviter, sordide adpresse-pubescentibus; calycibus in-

aequilateralibus, subfalcatis, tubo extus dense breviter pubescenti, obscure sulcato, basi acuto, 5–7 cm. longo, sursum circiter 5 mm. diametro, limbo sub anthesin patulo vel subpatulo, 1 cm. diametro, lobis 5, plus minusve inaequalibus, lobis late ovatis, apice rotundatis, intus glabris, 2.3–3 mm. longis et 3.5–4 mm. latis; petalis unguiculatis, utrinque sordide breviter cinereo-pubescentibus, limbis ellipticis vel obovatis, late rotundatis, basi acutis vel late acutis, 10–11 cm. longis, 7–9 mm. latis, unguiculis 3–6 mm. longis et 1–2 mm. latis; staminibus fertilibus 3, filamentis glabris, 1.5–2 cm. longis, staminodeis plerumque 6, plus minusve connatis, glabris, 3–4 lanceolatis e basi leviter incrassatis, 2–3 majoribus, e basi valde incrassatis ovoideis vel obovoideis, interdum inaequilateralibus, apice abrupte contractis, filamenta sterilia ad 2 mm. longa ferentibus; ovario breviter unguiculato, anguste oblongo, densissime pubescente, sub anthesin 1 cm. longo et 3 mm. lato, stylis glabris, ovarium aequantibus.

INDO-CHINA, Tonkin, Hoa Binh Province, Muong Thon, route from Hanoi to Hoa Binh, *Pételot* 2664, April 21, 1940, along small streams.

This species is strongly characterized by its elongated racemes forming a terminal panicle, the younger parts of the inflorescences densely and shortly subcinereous-pubescent, the older parts glabrous or nearly so, the inequilateral, somewhat falcate calyx-tubes, the petals densely pubescent on both surfaces, the peculiar staminodes, several with greatly thickened bases and all more or less connate, and the rather thin shortly-lobed, in general orbicular, cordate leaves which are glabrous, black and shining on both surfaces when dry. It falls in Gagnepain's group I (with pubescent, *not glabrous*, ovaries), but is not closely allied to any of the twenty-one species placed by him in this assemblage.

MELIACEAE

Dysoxylum Gobara (Ham.) comb. nov.

Guarea Gobara Ham. Trans. Wern. Soc. **6**: 306. *f.* 1832.

Guarea procera Wall. List no. 1261. 1829, *nomen nudum*.

Dysoxylum procerum Hiern in Hook. *f.* Fl. Brit. Ind. **1**: 547. 1875; C. DC. Monog. Phan. **1**: 486. 1878; Pellegr. in Lecomte, Fl. Gén. Indo-Chine **1**: 744. *f.* 81, 6–11. 1911, excl. syn. Blume.

Guarea disyphonia Griff. Not. **4**: 503. 1854, Ic. **4**: *t.* 585, *f.* 1. 1854.

Hartighsea Gobara Wight & Arn. ex Voigt, Hort. Suburb. Calcut. 136. 1845, *nomen nudum*.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 6581, 6603, Oct. and Nov. 1940, in open forests, alt. 700–800 m. Assam and Khasia to Thailand, Burma, and Yunnan.

Craib has already noted, Fl. Siam. Enum. **1**: 252. 1926, that if *D. procerum* Hiern is really the same as *Guarea Gobara* Ham. the specific name should be changed. After an examination of Hamilton's description and his figure of the fruit, I see no reason to consider that he had other than the species long known as *Dysoxylum procerum* Hiern. Although C. de Candolle gives the range of the species to Java (var. *integrum*), I am convinced, after examining an actual specimen of *Dysoxylum excelsum* Blume, named by Blume, that Pitard erred in citing de Candolle's variety as a synonym of *D. procerum* Hiern. Craib notes that *D. turbinatum* King of the Malay Peninsula is a very closely allied species.

BUXACEAE

Buxus pubifolia sp. nov.

Frutex circiter 5.2 m. altus, ramulis petiolis et foliis subtus, praesertim secus costam, breviter molliterque pubescentibus, ramis glabris, teretibus vel obscure sulcatis, subpallidis, ramulis ultimis 1–1.2 mm. diametro, teretibus vel sulcatis; foliis brevissime petiolatis, subchartaceis, ellipticis vel oblongo-ellipticis, 6–10 cm. longis, 2.5–5 cm. latis, acutis, basi late acutis, supra glabris, in sicco subolivaceis, opacis vel leviter nitidis, subtus pallidioribus, nervis primariis 3–5 mm. distantibus, utrinque circiter 17, gracilibus, utrinque leviter elevatis, haud perspicuis; petiolo pubescenti, crasso, 1–1.5 mm. longo; inflorescentiis ♂ axillaribus terminalibusque, subsessilibus, subglomeratis, densis, circiter 6 mm. longis, rhachibus dense pubescentibus paullo productis, bracteis ovatis, acute acuminatis, glabris vel subglabris, 1.5–2 mm. longis; pedicellis ad 1 mm. longis, leviter pubescentibus; floribus masculis confertis, 4-meris, sepalis binis exterioribus obscure carinatis, quam interioribus paullo minoribus, interioribus late elliptico-ovatis vel suborbiculari-ovatis, late rotundatis, leviter cucullatis, glabris, circiter 1.5 mm. longis et 1.3 mm. latis; filamentis glabris, 2–3 mm. longis, pistilloidiis subtruncatis, circiter 1.2 mm. diametro, irregulariter sulcatis; floribus ♀ fructibusque ignotis.

INDO-CHINA, Annam, Province of Quang Binh, My Duc, *Pételot 6017*, July 1930, a shrub 5.2 m. high, in open forests at the base of calcareous formations.

A species characterized by its medium sized, relatively thin leaves, which are densely and softly short-pubescent beneath especially along the midribs, the same type of indumentum being present on the slender branchlets and on the short petioles. The staminate inflorescences are reduced to dense glomerules about 6 mm. in diameter.

CELASTRACEAE

Microtropis rhynchocarpa sp. nov. § *Ramiflorae*.

Frutex glaber, ramis teretibus, ramulis ultimis (novellis) circiter 2 mm. diametro, brunneis, sursum plus minusve compressis canaliculatisque; foliis oblongo-ellipticis vel anguste oblongo-obovatis, 15–20 cm. longis, 5–8 cm. latis, chartaceis, in sicco laevibus, haud verruculosus, supra subolivaceis, subtus brunneis, deorsum angustatis, basi acutis, apice subabrupte breviter (1 cm.) obtuse acuminatis; nervis primariis utrinque 7–9, subadscendentibus, distantibus, subtus elevatis, gracilibus sed perspicuis, laxe arcuato-anastomosantibus, reticulis primariis secundariisque laxis, vix perspicuis; petiolo 1 cm. longo; floribus ignotis; fructibus in ramis vetustioribus in axillis defoliatis fasciculatis; sepalis persistentibus 5, late ovatis, subacutis, circiter 2 mm. longis; fructibus anguste ovoideis, cum rostro 2 cm. longis, 8–9 mm. diametro, extus brunneo-maculatis haud furfuraceis, sursum angustatis, subabrupte conspicue rostratis, rostris deorsum ad 2 mm. sursum circiter 1 mm. crassis, 7–8 mm. longis; pedicellis incrassatis, 2–3 mm. longis, rugosis.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot 6607*, Nov. 1, 1940, in open humid forests, altitude about 150 m.

A species characterized by its fairly ample, acuminate, slenderly but distinctly nerved, rather thin leaves, and especially by its fascicled prominently rostrate fruits which are borne in the axils of fallen leaves on the

older leafless branches. It is not closely allied to any of the species placed in the series *Ramiflorae* by myself and Miss Freeman, in our treatment of the known species of the genus, Proc. Am. Acad. Sci. Arts **73**: 271-310. 1940 (Mem. Gray Herb. **5**: 271-310).

ICACINACEAE

Gomphandra Chingiana (Hand.-Maz.) Sleumer, Notizbl. Bot. Gart. Berlin **15**: 238. 1940.

Stemonurus Chingianus Hand.-Maz. Sinensia **2**: 3. 1931; Hu, Ic. Pl. Sin. **3**: 44. t. 144. 1933.

INDO-CHINA, Tonkin, Chapa, *Pételot* 5450, 6360, April 1935 and April 1938, in open forests, alt. about 1500 m.

When first studied, this material was placed with *Gomphandra oppositifolia* Pierre, where it cannot possibly belong, and later with *G. hainanensis* Merr. The specimens seem clearly to represent Handel-Mazzetti's species, the type of which was from Kwangsi. *Ching* 8262 from Seh-feng Dar Shan, south of Nanning, Kweichow, distributed as *Schoepfia chinensis* Gardn. & Champ., is a fruiting specimen of this species, the fruits being up to 2 cm. in length and 8 mm. in diameter, oblong-ellipsoid, or sometimes slightly narrowed below. I suspect that certain Yunnan specimens should be referred to this species, including *Henry* 10492 (in fruit) and *Tsai* 55405, 60577, 60583, 61669, 62138. Handel-Mazzetti's species is allied to *Gomphandra hainanensis* Merr., but is apparently distinct.

Gomphandra mollis sp. nov.

Frutex vel arbor parva, foliis subtus dense breviter molliterque pubescentibus; ramis ramulisque teretibus, breviter pubescentibus, ramulis ultimis 1.5-2 mm. diametro; foliis oblongis, chartaceis vel junioribus submembranaceis, 13-20 cm. longis, 4.5-6.5 cm. latis, perspicue subabrupteque acuminatis, acuminibus acutis vel subobtusis, ad 1.5 cm. longis, basi late acutis vel subrotundatis, supra in sicco subatris vel atro-olivaceis, subnitidis, glabris vel junioribus ad costam impressam obscure breviter pubescentibus, subtus paullo pallidioribus, dense breviter molliterque pubescentibus; nervis primariis utrinque 8-10, supra haud perspicuis, subtus elevatis, distinctis, subadscendentibus, circiter ad marginem obscure vel haud arcuato-anastomosantibus, reticulis primariis laxis, inconspicuis; petiolo 10-12 mm. longo, dense breviter pubescenti; inflorescentiis oppositifoliis, pedunculatis, 4-5 cm. longis (pedunculo 1.5-2 cm. longo), breviter pubescentibus, ramis primariis plerumque 4, pedunculum terminantibus, subverticillatim dispositis, 1-1.5 cm. longis; floribus numerosis in ramulis ultimis subcapitatim dispositis, plus minusve confertis; floribus ♂ 5-meris, 4.5-5 mm. longis, brevissime pedicellatis vel subsessilibus; calycibus late cupulatis, circiter 1 mm. diametro, vix 0.5 mm. altis, truncatis vel obscurissime 5-denticulatis, margine obscure ciliatis; calycis tubo 3 mm. longo, glabro, lobis ovatis vel ovato-lanceolatis, 1-1.5 mm. longis, acuminatis, acuminibus inflexis; filamentis 4-5 mm. longis, planis, sursum circiter 1 mm. latis, deorsum angustatis, in partibus inferioribus ($\frac{1}{2}$ - $\frac{2}{3}$) glabris, supra intus barbatis, pilis flaccidis, pellucidis, 1-1.5 mm. longis, apicibus leviter subclavatis; antheris ellipsoideis, 0.7-1 mm. longis; ovarii rudimento glabro, subconico, circiter 1 mm. longo.

INDO-CHINA, Tonkin, Sontoy Province, Da Chong, *Pételot* 2658, 7949 (TYPE), May 7, 1936 and May 4, 1940. CHINA, Yunnan, Ping-pien Hsien, *Tsai* 60361, June 20, 1934, in ravines, altitude about 1100 m.

Gomphandra mollis Merr. is well characterized by its indumentum and its subcapitately arranged flowers on the four radiating branches of the leaf-opposed inflorescence. When first examined the material was referred to *Gomphandra oppositifolia* Pierre (*Stemonurus oppositifolius* Howard, Jour. Arnold Arb. **21**: 469. 1940), where it certainly does not belong. Pierre's type, a fruiting specimen, the flowers still unknown, was from Bien-hoa, near Saigon, in southern Indo-China.

***Gomphandra Petelotii* sp. nov.**

Arbor circiter 8 m. alta, glabra, vel partibus novellis inflorescentiisque plus minusve breviter pubescentibus, ramis teretibus, glabris, ramulis ultimis circiter 1 mm. diametro; foliis oblongis, oblongo-ellipticis vel late oblongo-lanceolatis, subchartaceis, in sicco atris, subtus paullo pallidioribus, 5–9 cm. longis, 2–3 cm. latis, breviter subobtusae acuminatis, basi late acutis vel subrotundatis; nervis primariis utrinque circiter 6, supra obscuris vel obsoletis, subtus haud perspicuis, circiter ad marginem obscure arcuato-anastomosantibus, reticulis obsoletis; petiolo 5–7 mm. longo, glabro; inflorescentiis terminalibus et in axillis superioribus, subcymosis, obscure pubescentibus glabrescentibus, 1.5–2 cm. longis, ad 2 cm. latis, pedunculatis, pedunculo 5–8 mm. longo, apice subradiatim 4-ramoso, ramis pedunculum subaequantibus, patulis, floribus in ramulis ultimis paucis, subcymosim dispositis, subsessilibus vel breviter pedicellatis, pedicellis 1–2 mm. longis; floribus ♂ 4–5-meris, 3.5–4 mm. longis, glabris; calycibus late cupulatis, circiter 1 mm. diametro, 0.5–0.7 mm. altis, obscure 4–5-denticulatis; corollae tubo 2.5 mm. longo, lobis 4–5, ovatis, circiter 1.5 mm. longis, graciliter acuminatis, acuminibus inflexis; staminibus plerumque 5, filamentis planis, circiter 3 mm. longis, sursum 0.5 mm. latis, deorsum angustatis, infra medio glabris, supra medio intus barbatis, pilis pellucidis, flaccidis, apicibus plus minusve clavatis, superioribus antheros excedentibus; antheris ellipsoideis, 0.8 mm. longis; ovarii rudimento glabro, subconico, acuto, 1 mm. longo, floribus ♀ fructibusque ignotis.

INDO-CHINA, Sontoy Province, Mount Bavi, *Pételot* 2647, May 18, 1940, in open forests, alt. about 500 m.

A species characterized by its short, radiately 4-branched, terminal and axillary inflorescences and its relatively small obscurely nerved leaves, the reticulations obsolete or subobsolete, the few flowers cymosely disposed on the ultimate branches of the inflorescence. Its general alliance is with the Chinese *Gomphandra Chingiana* (Hand.-Maz.) Sleumer.

In retaining *Gomphandra* Wallich as a valid genus distinct from *Stemonurus* Blume, I follow Koorders & Valetton, Bijdr. Boomsoort. Java **5**: 144–151. 1900 (Meded. Lands Plant. **23**: 144–151). In describing the genus, Blume, Bijdr. 643. 1825, included four species, *S. pauciflorus* Bl., *S. secundiflorus* Bl. and *S. javanicus* Bl. which he placed in his section one (unnamed), and *S. frutescens* Bl. which he placed in his section *Anacolosa*. He indicated no type. *Stemonurus frutescens* Bl. is eliminated from consideration, as in Mus. Bot. Lugd.-Bat. **1**: 250–251. 1850 he raised this section to generic rank, the type being *Anacolosa frutescens* (Blume) Blume.

Engler, Nat. Pflanzenfam. **3**(5): 247. 1893, retained *Stemonurus* Blume as a valid genus with *Gomphandra* Wall. and *Medusanthera* Seem. as synonyms, but indicated no type of Blume's genus; at the same time he placed *Stemonurus* in part (as to *S. secundiflorus* Blume) as a synonym of *Urandra* Thwaites. It should be noted that when Blume again considered his genus *Stemonurus*, Mus. Bot. Lugd.-Bat. **1**: 249–250. 1850, he somewhat amplified his generic description, and in this amplification he very definitely includes specific characters of *Stemonurus secundiflorus* Blume, yet for some unexplained reason he did not include this species in his text, although it is the only representative of the group that he figured, op. cit. f. 45. It might be argued that Blume intended to restrict his genus *Stemonurus* to its *Gomphandra* characters; yet even here he indicated no type for his genus, and we still have three of the original species from which to select the type. The international code provides that any author treating a genus may designate the type species, and this Koorders and Valeton very definitely did in 1900 thus: "Genus *Stemonurus* Bl. cuius species typica *S. secundiflorus* a Blume in Tab. XLV Mus. Bot. optime delineata est, species alias nonnullas generice diversas et ad *Gomphandram* Wall. referendas includit. Hoc autem jam a Beccari et Valeton bene demonstrandum est et nullam habet rationem. (ut fecit Engler in Nat. Pfl.) nomen *Stemonurus* pro *Gomphandra* et *Urandra* Thw. (jam ab auctore ipso demissum, Thw. enum.) in *Stemonuri* locum substituere." Even earlier than this Beccari, Malesia **1**: 111–116. 1877 had restricted *Stemonurus* Blume to that group of species having the general characters of *Stemonurus secundiflorus* Blume, among Blume's species considering and describing only this one, but adding several others; he thus eliminated all of the other species placed by Blume under *Stemonurus* and this very elimination leaves *S. secundiflorus* Blume as the type of the genus. Valeton, Crit. Overzigt Olac. 234–237. 1886, followed Beccari's interpretation. Sleumer, Notizbl. Bot. Gart. Berlin **15**: 238. 1940, in transferring *Stemonurus Chingianus* Hand.-Maz. to *Gomphandra*, conforms to this interpretation of Blume's genus. Howard, on the other hand, Jour. Arnold Arb. **21**: 461–471. 1940, discussed the case at length and reached entirely different conclusions. He recognized *Urandra* Thwaites to include *Stemonurus secundiflorus* Blume, *Gomphandra* Wallich to take various other species described under *Stemonurus*, and *Medusanthera* Seem. to take still others. He calls attention to the differences in Blume's amplified generic description of 1850 as compared with the original of 1825 and notes particularly that in this amplified description he lists specific characters of *Stemonurus secundiflorus* Blume, the species being one of those on which the original generic description was based. Here I would interpret Blume's action as slightly modifying his original description and making it even more applicable to the *Stemonurus secundiflorus* complex, as well as selecting this species for his detailed illustration of the genus as evidence that he considered this to be particularly typical of his genus *Stemonurus*; however, this can be considered as evidence only, not proof. The fact that Beccari, Valeton, and Koorders and Valeton successively and specifically selected *Stemonurus secundiflorus* Blume as the type

of the genus in their interpretation of *Stemonurus* Blume is all that is needed to typify the genus, and to stabilize the name *Stemonurus*. The International Code recommends that if an author has revised a genus and if he has designated a type as Beccari did, followed by Valetton, and by Koorders and Valetton, this choice should stand except for very special reasons; and there seems to be no special reason for abandonment of Beccari's conclusions and those of other authors who have followed him. The retention of *Stemonurus* Blume as thus interpreted by Beccari and others will result in much fewer changes in names than would otherwise be the case. Under the circumstances I do not accept Howard's conclusions, and here retain *Gomphandra* Wallich. *Stemonurus* Blume is also retained for a group of species in the *S. secundiflorus* complex with *Urandra* Thwaites as a synonym.

SABIACEAE

Meliosma coriacea sp. nov. § *Simplices*.

Species *M. sterrophyllae* Merr. affinis, differt nervis lateralibus paucioribus, floribus in ramulis ultimis glomerato-spicatum dispositis. Arbor circiter 8 m. alta, inflorescentiis exceptis glabro; ramulis ultimis circiter 4 mm. diametro; foliis simplicibus, oblongo-ellipticis, integris, coriaceis, 12–18 cm. longis, 6–7 cm. latis, obtuse acuminatis, basi acutis vel subdecurrenter cuneatis, in sicco supra castaneis, subtus pallide brunneis, utrinque subnitidis; nervis primariis utrinque circiter 8, supra subobscuris, subtus valde elevatis, perspicuis, curvatis, circiter ad marginem arcuato-anastomosantibus, reticulis distinctis; petiolo glabro, 2.5–3.5 cm. longo; paniculis erectis, multifloris, terminalibus et ex axillis defoliatis, pedunculatis, 12–20 cm. longis, partibus vetustioribus parce, junioribus subdense breviter subadpresse pallide subferrugineo-hirsutis, ramis primariis distantibus, longioribus ad 6 cm. longis; floribus numerosis, in ramulis ultimis subglomerato-spicatum confertis, sessilibus vel ultimis breviter pedicellatis, bracteolis suborbiculari-ovatis, rotundatis, 0.8 mm. longis, margine brevissime ciliato-hirsutis; sepalis 5, orbiculari-ovatis, circiter 1 mm. longis, margine brevissime ciliato-hirsutis exceptis glabris, binis exterioribus quam interioribus paullo angustioribus; petalis orbiculari-ovatis, rotundatis, circiter 1.8 mm. longis, margine minute breviter ciliato-hirsutis, utrinque glabris; staminibus fertilibus 2, filamentis vix 1 mm. longis, glabris, appendicibus dorsalibus bifidis, lobis membranaceis, linearibus, circiter 0.5 mm. longis, sterilibus (staminodeis) circiter 1 mm. longis; ovario ovoideo, glabro, cum stylo circiter 1.5 mm. longo.

INDO-CHINA, Sontoy Province, Mount Bavi, *Pételot* 2585, October 2, 1940, alt. about 800 m.

Meliosma longipes sp. nov. § *Simplices*.

Arbor 7–8 m. alta, inflorescentiis exceptis glabra, ramulis ultimis circiter 5 mm. diametro, plus minusve lenticellatis, pallide brunneis; foliis longissime (8–10 cm.) petiolatis, obovatis vel obovato-ellipticis, coriaceis, integris, utrinque glabris, 22–33 cm. longis, 11–17 cm. latis, in sicco supra atro-olivaceis, opacis, subtus pallide brunneis, apice (haud viso) ut videtur acutis vel acuminatis, basi acutis; nervis primariis 2.5–4 cm. distantibus, utrinque circiter 10, supra vix impressis, subtus valde elevatis, perspicuis, circiter ad marginem arcuato-anastomosantibus, reticulis primariis ter-

tiariisque perspicuis, elevatis; petiolo glabro, ad 10 cm. longo; paniculis terminalibus et ex axillis defoliatis, 15–25 cm. longis, erectis, pedunculatis, ramis primariis paucis, distantibus, longioribus ad 12 cm. longis, consperse breviter subadpresse subferrugineo-hirsutis (praesertim partibus junioribus), floribus in ramulis ultimis racemose dispositis, haud glomeratis, pedicellis crassis, breviter adpresse hirsutis, 1–1.5 mm. longis, bracteolis late ovatis, circiter 1 mm. longis, subacutis, parce breviter adpresse hirsutis; sepalis 5, binis exterioribus ellipticis, trinis interioribus suborbiculari-ovatis vel subreniformi-ovatis, omnibus circiter 1.2 mm. longis, rotundatis, ad marginem brevissime ciliatis; petalis 3, margine minute breviter ciliato excepto glabris, suborbicularibus vel obovato-orbicularibus, circiter 2 mm. longis, 2–2.5 mm. latis; filamentis fertilibus glabris, 1 mm. longis, appendicis dorsalis bifidis, lobis linearibus, 0.5 mm. longis, sterilibus (staminodeis) 3 circiter 1 mm. longis et latis, partibus apicalis incurvatis, sulcatis, filamentis latissimis; ovario ovoideo, glabro, cum stylo circiter 1.5 mm. longo, 2-loculari, stylo crasso, sursum angustato.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2588, October 2, 1940, alt. about 800 m.

Among the simple-leaved species with very large, entire, glabrous blades, this is very strongly characterized by its unusually long petioles, the longest one seen being 10 cm. in length.

Meliosma angustifolia Merr. Philip. Jour. Sci. **21**: 384. 1922; Merr. & Chun, Sun-yatsenia **2**: 11. 1934; Cufodontis, Oesterr. Bot. Zeitschr. **88**: 256. 1939.

Meliosma crassifolia Hand.-Maz. Sinensia **3**: 191. 1933.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2614, 2629, May 24 and July 2, 1940, altitude about 700 m. Kwangsi, Kwangtung, and Hainan.

RHAMNACEAE

Rhamnus subapetalus sp. nov.

Species *Rhamno napalensi* (Wall.) Laws. affinis, differt foliis inflorescentiisque in sicco pallidis, haud nigrescentibus, foliis acutissime subcaudato-acuminatis, inflorescentiis glabris vel sub lente minutissime puberulis, petalis 0 vel quoad visis 1–3 tantum, minutis, lineari-lanceolatis, acuminatis, quam filamentis bene brevioribus, planis. Frutex scandens vel subscandens, omnibus partibus glaberrimis vel inflorescentiis sub lente minutissime puberulis, ramis brunneis, teretibus, subverrucoso-lenticellatis, ramulis ultimis ad 1 mm. diametro; foliis plerumque oblongo-ellipticis, firmiter chartaceis, in sicco pallidis utrinque subconcoloribus nitidisque, 10–15 cm. longis, 4–8 cm. latis, basi late acutis, apice graciliter subcaudato-acuminatis, acuminibus rectis vel falcatis, ad 2 cm. longis, distincte apiculatis, margine anguste cartilagineis, leviter recurvatis, irregulariter subcrenato-serrulatis, dentibus 3–5 mm. distantibus, minute subatro-apiculatis; nervis primariis utrinque 6–8, curvato-adscendentibus, subtus elevatis, perspicuis, ad marginem plus minusve arcuato-anastomosantibus, reticulis ultimis distinctis, transverse parallelis, leviter undulatis; petiolo 12–25 mm. longo, glabro; stipulis lanceolatis, acuminatis, 1–1.5 mm. longis, deciduis; inflorescentiis axillaribus, racemosis, efoliatis et 1–3 cm. longis, vel depauperato-paniculatis, ad 6 cm. longis, ramis folia parva (1–2.5 cm. longa) gerentibus; floribus solitariis vel depauperato-fasciculatis, pedicellis circiter 1 mm. longis, minutissime obscureque puberulis; floribus ♂ ut videtur viridibus, 5-meris, circiter

4 mm. diametro, in sicco pallidis haud nigricantibus; sepalis oblongo-ovatis, acutis vel leviter acuminatis, ad 1.5 mm. longis; petalis 0 vel 1-3, minutis, deciduis, lineari-lanceolatis, acuminatis, vix 0.5 mm. longis, quam filamentis bene brevioribus, planis, filamenta haud includentibus; floribus ♀ ♂ simillimis, calycis lobis mox deciduis; stylis brevibus, 3-partitis, mox deciduis; fructibus junioribus globoso-obovoideis, glabris, circiter 5 mm. longis.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2605 (type), 3119, 3121, July 1927 and 1940, scandent in forests, alt. about 1500 m.

When the first material of this apparently distinct species was received in 1928, it was tentatively placed in *Rhamnus napalensis* (Wall.) Laws. in spite of certain manifest differences, especially in the pale rather than black or blackish color of the branchlets, leaves, inflorescences, and flowers, when dry. *Rhamnus napalensis* (Wall.) Laws. is currently credited with a distinctly wide geographic range. To it I have reduced *Rhamnus sumatranus* Ridl. and Rehder has reduced the Chinese *Rhamnus paniculiflorus* Schneider. It is suspected that other proposed species should also be reduced, such as *Rhamnus javanicus* Miq. (already reduced by Koorders), the Philippine *Rhamnus philippinensis* C. B. Rob., and *Rhamnus nigrescens* Lauterb. of New Guinea. In spite of the striking differences in the actual color of the dried specimens of *Rhamnus napalensis* (Wall.) Laws. and *R. subapetalus* Merr., I should have hesitated in proposing the latter as a new species but for the very striking petal characters of the latter, these being totally different from the petals of the *Rhamnus napalensis* (Wall.) Laws. complex; as noted in the description the petals may be entirely wanting, or, if present, then only from 1 to 3 in a flower, slender, obscure, acuminate, flat, shorter than and not wider than the filaments, and not enclosing the latter.

VITACEAE

Tetrastigma Henryi Gagnep. Not. Syst. I: 264. 1910.

INDO-CHINA, Tonkin, route from Hanoi to Hoa Binh at Muong Thon, *Pételot* 5975, March 1933, in savannas, alt. about 200 m. Yunnan, Hainan.

With Gagnepain's interpretation of this species as having from palmately 3-foliolate to pedately 5-foliolate leaves, it is difficult to see how *Pételot* 5975 with strictly 5-foliolate pedate leaves can be distinguished. It may be that more than a single species was included in the original description, but in that case it is believed that the species should be interpreted from the first number cited, *Henry* 11756, a form with strictly 3-foliolate leaves. *Henry* 9992, the last number cited by Gagnepain, is very closely matched by *Pételot* 5816 from Chapa, both specimens being in fruit and in about the same stage of development; and yet one hesitates to state that *Pételot* 5975, with pedately 5-foliolate leaves, represents the same species as *Pételot* 5816 with digitately 3-foliolate ones.

Tetrastigma chapaensis sp. nov.

Frutex scandens, inflorescentiis exceptis glaber, ramulis ultimis teretibus, brunneis, longitudinaliter striatis, circiter 2 mm. diametro, internodiis 8-10 cm. longis; foliis longe (7-8 cm.) petiolatis, 3-foliolatis, foliolis lanceo-

latis vel oblongo-lanceolatis, chartaceis, olivaceis, graciliter subcaudato-acuminatis, basi acutis, aequilateralibus, vel lateralibus leviter inaequalateralibus, 14–18 cm. longis, 3.5–4.5 cm. latis, margine plus minusve undulatis, distanter (1–2 cm.) serratis, dentibus apice callosis; nervis primariis utrinque circiter 10, gracilibus, subtus elevatis, distinctis, curvato-adscendentibus, ad marginem arcuato-anastomosantibus, reticulis primariis gracilibus, distinctis, laxis; petiolulis valde inaequalibus, lateralibus 8 mm., centralibus 2.5 cm. longis; inflorescentiis axillaribus, solitariis, longe (4–5 cm.) pedunculatis, radiatim 4-ramosis, ramis circiter 3 cm. longis, floribus subaxe cymosim dispositis, partibus floriferis 4–5 cm. latis, ramis et pedicellis breviter subpappilose brunneo-pubescentibus, pedicellis circiter 3 mm. longis, pedunculo in parte 1–3 inferiore bracteis 4 oppositas ellipticas rotundatas subinduratas concavas glabras subpatulas ferentibus; calycibus breviter subpapillatim brunneo-pubescentibus; petalis 4, glabris, oblongis, 2 mm. longis, apice cucullatis, dorso brevissime corniculatis; ovario styloque glabro, stylo 1 mm. longo, stigmatibus 4, brevis, radiatis.

INDO-CHINA, Tonkin, Chapa, *Pételot* 3074, July 1927, alt. about 1500 m.

A species, in accordance with Gagnepain's treatment of the genus, allied to *Tetrastigma erubescens* Planch. but with differently shaped very much larger leaflets.

ELAEOCARPACEAE

Elaeocarpus limiteanus Hand.-Maz. *Sinensia* **3**: 193. 1933; Merr. & Chun, *Sunyatsenia* **2**: 63. 1935.

Elaeocarpus Maclurei Merr. *Lingnan Sci. Jour.* **13**: 63. 1934.

INDO-CHINA, Tonkin, Chapa, *Pételot* 1787, 3582, 6156, April 1925, August 1929, and July 1931, in forests, alt. about 1500 m. Kwangsi and Hainan.

Handel-Mazzetti's species was based on a fruiting specimen from Kwangsi and *E. Maclurei* Merr. was described from a Hainan flowering specimen. With abundant material in all stages of development from Kwangsi, Hainan, and now northern Indo-China, I see no valid reason for trying to distinguish two species here. There is an isotype of Handel-Mazzetti's species in the Britton Herbarium, New York Botanical Garden.

Elaeocarpus linearifolius Knuth, *Repert. Sp. Nov.* **49**: 66. 1940.

This species was based on *Pételot* 3748 from Chapa, Tonkin, Indo-China, and *Clemens* 3484 from the vicinity of Tourane, Annam. I have seen no specimens that I consider to be referable to Knuth's species.

Elaeocarpus Petelotii sp. nov. § *Monocera*.

Arbor, inflorescentiis floribusque exceptis glabra, ramulis ultimis teretibus, 4–5 mm. diametro, novellis plus minusve resinosis; foliis plus minusve confertis, oblongo-ellipticis vel anguste oblongo-obovatis, coriaceis, utrinque glaberrimis et minute distanter verruculosis, 9–11 cm. longis, 3.5–5 cm. latis, breviter obtuse acuminatis, basi acutis, margine crenato-serrulatis, dentibus 3–7 mm. distantibus, minute atro-apiculatis, in sicco pallide brunneo-viridibus, supra plerumque nitidis, subtus opacis, paullo pallidioribus, nervis primariis utrinque 7–8, subtus leviter elevatis, curvatis, arcuato-anastomosantibus; petiolo glabro, circiter 1.5 cm. longo; racemis numerosis in ramulis ultimis cum foliis confertis, 6–7 cm. longis, glabris vel parcissime pubescentibus, pedicellis glabris vel subglabris, 6–7 mm. longis; floribus 5-meris,

9 mm. longis; sepalis lanceolatis, acuminatis, 9 mm. longis et 2 mm. latis, coriaceis, extus glabris, in sicco brunneis, intus deorsum perspicue carinatis et glabris vel subglabris sursum cum margine breviter cinereo-pubescentibus; petalis angustis, anguste oblongis, sursum vix vel leviter ampliatis, sepala aequantibus, circiter 1.5 mm. latis, intus dense retrorse hirsutis, deorsum margine plus minusve inflexis perspicue carinatis, extus dense breviter pallide adpresse pubescentibus, sursum (3 mm.) in lacinias 12-14 graciles 2-2.5 mm. longas fissis; staminibus circiter 25, filamentis (1.5-2 mm.) et antheris lineari-oblongis (3.5-4 mm.) minute scaberulis, loculo uno obtuso, altero breviter (0.7 mm.) aristato; disco circiter 2 mm. diametro, glandulis 5, retusis vel bifidis, leviter connatis, parcissime breviter pubescentibus; ovario ovoideo, 2 mm. longo, dense breviter adpresse pallide hirsuto, 3-loculari, loculis 6-ovulatis; stylo 4-4.5 mm. longo, leviter pubescente.

INDO-CHINA, Tonkin, Massif de Tam Dao, *Pételot* 4580, December 1930.

By Gagnepain's arrangement of the Indo-Chinese species, this falls in the group with *Elaeocarpus Bonii* Gagnep. but it has larger flowers than those of the latter species, the petals with more numerous laciniae. By Corner's different arrangement of the Malay Peninsula species (*Gard. Bull. Straits Settlements* **10**: 310-316, 1939) it falls in his pentamerous group, section B.

Sloanea sinensis (Hance) Hemsl. Hook. Ic. **27**: sub t. 2628, 1900; Hu, Jour. Arnold Arb. **5**: 230, 1924; *Rehd. op. cit. **15**: 91, 1934.

Echinocarpus sinensis Hance, Jour. Bot. **22**: 108, 1884.

INDO-CHINA, Annam, Mt. Bana, *Clemens* 3897, May-July 1927, a small tree in forests. Hunan, Chekiang, Fukien, Kwangtung, Kweichow and Kiangsi.

Gagnepain, in Lecomte, Fl. Gén. Indo-Chine **1**: 563, 1910, may have included this form in his conception of *Sloanea Sigun* (Blume) K. Sch., but the cited specimen from Indo-China conforms with Hance's species, the spines on the relatively small capsules being slender and densely arranged. In Blume's Javan type the spines are stouter and are very loosely arranged, as well illustrated by Koorders and Valetton, Atlas, Baumart. Java **3**: t. 434, 1914. The allied Chinese form that Gagnepain has illustrated in Lecomte, Fl. Gén. Indo-Chine **1**: 563, f. 59, 1910, and Not. Syst. **1**: 165, f. 7, 1910, as *Sloanea Hanceana* Hemsl. (*Echinocarpus sinensis* Hemsl. Ann. Bot. **9**: 147, 1895, non Hance 1884) is *Sloanea Hemsleyana* (Ito) Rehd. & Wils. in Sargent, Pl. Wils. **2**: 361, 1915 (*Echinocarpus Hemsleyanus* Ito, Jour. Sci. Univ. Tokyo **12**: 349, 1899). Other synonyms of *Sloanea sinensis* (Hance) Hu are *Castanopsis Cavaleriei* Lév. and *Sloanea chengfangensis* Hu. I do not think that *Sloanea hongkongensis* Hemsl. in Hook. Ic. **27**: t. 2628, 1900 can be distinguished from *S. sinensis* (Hance) Hemsl.

STERCULIACEAE

Sterculia Henryi Hemsl. Kew Bull. **1908**, 179, 1908.

INDO-CHINA, Tonkin, Chapa, *Pételot* 5809, April 1936, a shrub 1-1.5 m. high, on banks of a ravine, alt. 1300 m. Yunnan.

When first studied, this specimen was indicated as an apparently new

*While Hu in 1924 independently transferred Hance's species to *Sloanea*, Hemsley had already made the transfer in 1900 thus: "*S[loanea] sinensis*, Hemsl. (*Echinocarpus*, Hance)" and the authority should be Hemsley.

species, dedicated to the collector, but on critical reconsideration I conclude that *Sterculia Henryi* Hemsl. is represented. The Chapa material has somewhat wider leaves than Hemsley admits for *Sterculia Henryi* Hemsl., described as 4–6 cm. wide, but the maximum width of one of our Henry specimens from Yunnan is 9 cm., and 9 cm. is the maximum width on the Pételot specimen above cited. The indumentum, inflorescence, bracteole, and floral characters are the same as in Hemsley's species, while the habit (a small shrub) and the characteristic crowded bracts or stipules at the tips of the branches are also identical.

DILLENIACEAE

***Saurauia macrotricha* Kurz ex Dyer in Hook. f. Fl. Brit. Ind. 1: 287. 1874.**

INDO-CHINA, Tonkin, Chapa, Massif de Fan Tsi Pan, *Pételot* 2689, July 1940, a shrub 4–5 m. high with red flowers, in open forests, alt. about 1300 m. Burma, Yunnan, and Khasia (Jaintia Hills, *Ruse* 152).

The original and only published description is very incomplete, but the above cited specimen conforms to the brief characters as given, and the specimen moreover matches *Ruse* 152, determined at Calcutta as representing Kurz's species. The type was from either Burma or Yunnan, both localities being cited in the original description; I have seen no Yunnan or other Chinese material that I consider to represent Kurz's species.

THEACEAE

Camellia pubicosta* sp. nov. § *Eucamellia

Frutex 4–5 m. altus, ramis teretibus, glabris, ramulis ultimis circiter 1.5 mm. diametro, breviter subpatule pubescentibus; foliis oblongis vel late oblongo-lanceolatis, 12–15 cm. longis, 4–5.5 cm. latis, chartaceo-coriaceis, perspicue subcaudato-acuminatis, acuminibus gracilibus, obtusis, 1.5–2 cm. longis, basi late acutis vel obtusis, margine, basi acumineque exceptis, distincte serrato-crenatis, dentibus 4–6 mm. distantibus, in sicco utrinque minutissime verruculosus, supra olivaceis vel olivaceo-viridibus, plus minusve nitidis, glaberrimis, subtus plerumque brunneis, secus costam dense subadpresse cinereo-pubescentibus, nervis obscure pubescentibus glabrescentibus; nervis primariis utrinque 12–14, supra impressis, subtus elevatis, perspicuis, leviter curvatis, arcuato-anastomosantibus, petiolo breviter pubescenti, 3–5 mm. longo; floribus in axillis superioribus, solitariis vel binis, 2 cm. diametro, ut videtur albidis, pedicellis glabris, circiter 8 mm. longis, bracteolis oblongo-ovatis, acutis vel acuminatis, circiter 2 mm. longis; sepalis exterioribus ovatis, acutis, 2–3 mm. longis, margine breviter ciliatis, interioribus majoribus, subreniformibus, rotundatis, ad 4 mm. latis; petalis utrinque glabris, minutissime verruculosus, subellipticis vel obovato-ellipticis, rotundatis, 11 mm. longis, 7 mm. latis; staminibus numerosissimis, filamentis glaberrimis, in parte libera filiformibus, 4–8 mm. longis, deorsum (2 mm.) connatis, tubum glabrum formantibus; ovario ovoideo, dense adpresse hirsuto; stylis 3, liberis, circiter 8 mm. longis, deorsum densissime, sursum sparsim adpresse hirsutis; fructibus globosis, 2.5 cm. diametro, vix vel tarde dehiscentibus, pericarpio minute verruculoso, crustaceo, vix 0.5 mm. crasso, glabro vel versus apicem plus minusve adpresse hirsuto; seminibus solitariis, globosis, 1.8 cm. diametro, brunneis, nitidis.

INDO-CHINA, Sontoy Province, Mount Bavi, *Pételot* 1727 (TYPE, flower), 2598 (fruit) Nov. 19, 1924, Aug. 28, 1940, a shrub 4 to 5 m. high, at altitudes from 400 to 800 m.

The first specimen of this, in flower, received at the University of California in 1925, was placed tentatively with *Camellia sinensis* (Linn.) O. Kuntze, where it manifestly does not belong, as verified in 1941 when a fruiting specimen was received from the same locality (Mount Bavi). It is distinguishable by its prominently nerved, subcaudate-acuminate, toothed leaves, its three free styles, numerous glabrous filaments united into a short tube, and its apparently indehiscent, 1-seeded globose fruits, the very thin pericarp being crustaceous.

Schima khasiana Dyer in Hook. f. Fl. Brit. Ind. **1**: 289. 1874, var. **sericans** Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. Kl. **61**: 108. 1924, Symb. Sin. **7**: 396. 1931.

INDO-CHINA, Tonkin, route from Laokay to Chapa, *Pételot* 3109, July 1927, a tree, 12 m. high, alt. 1900 m. Yunnan.

This specimen, in fruit, agrees very closely with an isotype of Handel-Mazzetti's variety (in flower). It impresses me as a very weak variety which perhaps should be merged with the species.

Schima khasiana Dyer var. **macrocarpa** var. nov.

A typo differt fructibus multo majoribus, globosis vel depresso-globosis, circiter 3 cm. diametro et 2.5 cm. alto.

INDO-CHINA, Tonkin, Chapa, *Pételot* 5802, August 1931, a small group of trees about 15 m. high, altitude 1500 m.

It may be desirable to make some other disposition of this large fruited form when flowering material becomes available. In vegetative characters it closely approximates *Schima khasiana* Dyer, and, to a degree approaches the var. *sericans* Hand.-Maz. in that the leaves are slightly pubescent beneath especially along the midrib in the lower part. The species occurs in northern India, Burma, southeastern Tibet and Yunnan.

DIPTEROCARPACEAE

Vatica subglabra sp. nov. § *Synaptea*.

Arbor magna, inflorescentiis minute pubescentibus exceptis glabra, vel ramulis novellis minutissime brevissime stellato-pubescentibus glabrescentibus; ramis teretibus, subcinereis vel subcinereo-brunneis, glabris, ramulis ultimis gracilibus, 1–1.5 mm. diametro, lenticellatis, brunneis, glabris, vel novellis minutissime breviter stellato-pubescentibus, indumento subferrugineo vel subcinereo; foliis chartaceis, oblongo-ellipticis, acuminatis, basi rotundatis vel latissime acutis, in sicco plerumque pallide olivaceis, utrinque subconcoloribus, 7–13 cm. longis, 2.5–5.5 cm. latis; nervis primariis utrinque 10–12, gracilibus, subtus leviter elevatis; petiolo glabro, 5–8 mm. longo; stipulis non visis, ut videtur deciduis; inflorescentiis axillaribus terminalibusque, 7–10 cm. longis, partibus vetustioribus glabris, junioribus minute breviter stellato-pubescentibus, indumento cinereo; floribus extus dense breviter cinereo-pubescentibus, pedicellis 3–5 mm. longis, minute stellato-pubescentibus; calycis lobis utrinque breviter cinereo-pubescentibus, binis paullo majoribus oblongis, rotundatis, 1–1.2 mm. longis, trinis minoribus paullo angustioribus, circiter 1 mm. longis, lanceolatis, acutis vel obscure acuminatis; petalis extus dense brevissime cinereo-pubescentibus, intus glabris, oblongis, vel deorsum leviter angustatis, obtusis; staminibus 15, filamentis

brevissimis, antheris 0.5 mm. longis, subtruncatis vel connectivo brevissime producto; ovario subdepresso, minute alveolato, minute puberulo; stylo tereti, glabro, 0.4 mm. longo, stigmatibus 3, minutis; fructibus globosis, circiter 7 mm. diametro, glabris vel consperse minute subgranulosis, sepalis persistentibus accrescentibus, erectis, glabris, binis majoribus oblongis, chartaceo-membranaceis, plerumque oblongis vel deorsum leviter angustatis, basi late acutis, apice rotundatis, 5-nerviis, reticulatis, 5-6 cm. longis, 1.4-1.7 cm. latis, trinis minoribus oblanceolatis, acutis vel obscure acuminate, 5-nerviis, 1.6-2 cm. longis, 4-5 mm. latis.

INDO-CHINA, Sontoy Province, To Phap, *Pételot* 2600 (TYPE, fruit), 2610, 2643, June 2, July 7, and August 15, 1940, a large tree near water courses.

This species clearly belongs in the group with *Vatica astrotricha* Hance, *V. faginea* Dyer, and *V. Dyeri* King, differing from all of them in its indumentum, which occurs only on the very youngest branchlets, the younger parts of the inflorescences, and on the flowers; this indumentum is minute and consists of more or less scattered, very short, cinereous or, at times, subferrugineous stellate hairs of a type quite different from that of the three species listed above. *Vatica tonkinensis* A. Chev. Bull. Écon. Indo-Chine **20**: 799. 1918, remains undescribed, like the considerable number of other proposed new species in various families whose names appear in the same paper.

FLACOURTIACEAE

Homalium tonkinense sp. nov. § *Blackwellia*.

Arbor circiter 6 m. alta, inflorescentiis paniculatis exceptis glaberrima; ramulis ultimis 1.5-2 mm. diametro, in sicco atris vel subatris; foliis oblongis vel oblongo-lanceolatis, perspicue longe acuminatis, subcoriaceis, 8-11 cm. longis, 3-4 cm. latis, basi acutis, in sicco supra nitidis, subtus paullo pallidioribus, margine subundulato-crenatis; nervis primariis utrinque 7-8, subtus elevatis, curvato-subadscendentibus, distinctis; petiolo 5-7 mm. longo, glabro; inflorescentiis paniculatis, paniculis terminalibus axillari-busque, amplis, multifloris, 9-15 cm. longis, subcinereo-pubescentibus, pilis brevibus, haud adpressis, ramis primariis ad 5 cm. longis; floribus 6-meris, in ramis ramulisque racemose dispositis, verticillatim-subfasciculatis haud confertis, circiter 3 mm. longis, articulatis, breviter patule ciliatis; calycis tubo subobconico, 2 mm. longo, vix vel obscure longitudinaliter sulcato, breviter patule pubescenti; sepalis 6, anguste oblongis vel lineari-oblongis, obtusis vel acutis, 2-2.5 mm. longis, longe ciliatis; petalis sepalis simillimis et aequantibus; staminibus 6, filamentis ad 4 mm. longis, deorsum longe consperse ciliatis, sursum glabris; ovario consperse longe ciliato; stylis 3, glabris vel basi consperse ciliatis, 2 mm. longis.

INDO-CHINA, Tonkin, Vinh Yen Province, route from Vinh Yen to Tam Dao, Dont des Linh, *Pételot* 6164, Oct. 15, 1936.

This species is most closely allied to *Homalium paniculiflorum* Merr. & Metc., of Hainan, which it closely resembles, but from which it may be readily distinguished by its differently shaped, long-acuminate leaves as well as by being entirely glabrous except for the inflorescences, while the indumentum on the latter is not appressed. The styles and filaments are distinctly shorter than in the Hainan species. Both species are manifestly allied to *Homalium cochinchinense* (Lour.) Druce (*H. fagifolium* Benth.),

from which they may be at once distinguished by their paniculate rather than strictly racemose inflorescences.

PASSIFLORACEAE

Passiflora pertriloba sp. nov. § *Decaloba-Polyanthea*.

Planta ut videtur herbacea, scandens, cirrhosa, ramis gracilibus, plus minusve villosis glabrescentibus, vix 2 mm. diametro, ramulis gracilioribus; foliis alternis, perspicue 3-lobatis, fere hastatis, ad 7 cm. longis et 8 cm. latis, basi latissime subtruncato-rotundatis, minute cordatis, 3-nerviis, subchartaceis, in sicco olivaceis, utrinque glabris vel junioribus ad costam nervosque leviter pubescentibus, margine breviter hirsutis, lobis ovatis, acutis vel leviter acuminatis, lobis terminalibus majoribus, 2.5–5 cm. longis, 2–4 cm. latis, lateralibus patulis, ad 2.5 cm. longis latisque; petiolo plus minusve hirsuto, 1.3–4 cm. longo, infra medio biglanduloso, glandulis subsessilibus vel brevissime stipitatis, ad 0.8 mm. diametro, subpatelliformibus; stipulis linearilanceolatis, graciliter acuminatis, pubescentibus, 4–5 mm. longis; floribus circiter 1.5 cm. diametro, plerumque 2–3-fasciculatis, axillaribus, pedicellis gracilibus ad 1 cm. longis, leviter pubescentibus, articulatis; calycibus glabris, lobis oblongo-lanceolatis, sursum angustatis, acutis, leviter acuminatis vel subobtusis, distincte reticulatis, circiter 6 mm. longis; coronae laciniae numerosae 2–4 mm. longae, 0.25 mm. latae, deorsum leviter angustatae; androgynophoro glabro, 4 mm. longo; staminibus 5, filamentis 2.5–3 mm. longis, antheris oblongo-ellipticis, 3 mm. longis; ovario glabro, subellipsoideo, stylis 2–3 mm. longis, stigmatibus capitatis.

INDO-CHINA, Tonkin, Hanoi, in hedges at the Mot Cot pagoda, *Pételot* 2482, Feb. 1938.

A species belonging in the general group with *Passiflora Leschenaultii* DC. and strikingly different from all the species hitherto described from Indo-China and contiguous areas. The leaves are prominently 3-lobed, almost hastate in shape, all lobes acute or slightly acuminate, the terminal one larger than the lateral ones, the latter distinctly spreading. The leaf shape in general reminds one of some of the species of *Acer* with 3-lobed leaves and some forms of *Hedera helix* Linn.

ELAEAGNACEAE

Elaeagnus Delavayi Lecomte, Not. Syst. **3**: 156. 1915.

INDO-CHINA, Tonkin, Chapa, *Pételot* 4466, Oct. 1932, in shrubby savannas, alt. 1500 m. Yunnan.

This specimen agrees with the original description and matches an isotype of Lecomte's species in the herbarium of the Arnold Arboretum.

Elaeagnus Loureirii Champ. Hook. Jour. Bot. Kew Gard. Miscel. **5**: 196. 1853; Serv. Beih. Bot. Centralbl. **25**(2): 68, f. 3, 12–15. 1909; Rehd. in Sargent, Pl. Wils. **2**: 416. 1915.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2121, Dec. 28, 1938, a shrub with long sprawling branches in shrubby savannas, alt. 1500 m. Hongkong, Kwangtung, and Yunnan.

This number was originally identified as representing *Elaeagnus gonyanthes* Benth., to which it cannot be referred. It agrees very closely with Hongkong and Yunnan material and with the published descriptions of Champion's species.

ARALIACEAE

Panax pseudo-ginseng Wall. Trans. Soc. Med. Phys. Calcutta 4: 117. 1829, Pl. As. Rar. 2: 30. t. 137. 1831.

Aralia pseudo-ginseng Benth. ex C. B. Clarke in Hook. f. Fl. Brit. Ind. 2: 721. 1879.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2489, April 1935, in open forests, alt. 1500 m. Himalayan region to Yunnan.

The Index Kewensis reference to Wallich's species is his 1831 publication, but the species was described in detail in 1829, cited by Wallich as "Act. Soc. Med. Phys. Calcutta iv. 117." This is the "Transactions" and the volume, which I have examined, was published in 1829. Pitard had only rhizomes of a *Panax* from Indo-China and included a short generic description only in Lecomte, Fl. Gén. Indo-Chine 2: 1162. 1923.

CORNACEAE

Cornus controversa Hemsl. Bot. Mag. 135: sub. t. 8261. 1909; Kew Bull. 1909: 331. 1909; Wang, Pflanzenr. 41(iv. 229): 49. 1910; Nakai, Fl. Sylv. Kor. 16: 81. t. 25, 26. 1927.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2485, April 1936, in shrubby savannas, alt. 1500 m. Himalayan region through China to Kwangtung and Shantung to Korea, Japan, and Formosa.

Hitherto a single species has been credited to Indo-China, *Cornus capitata* Wall.; Evrard in Lecomte, Fl. Gén. Indo-Chine 2: 1192. 1923. In addition to the very characteristic and widely distributed *Cornus controversa* Hemsl., which is well characterized by its large alternate leaves, the following opposite-leaved Indo-Chinese species is described as new:

Cornus oligophlebia sp. nov. § *Thelecrania*, *Amblycaryum*.

Arbor 12–15 m. alta, ramis ramulisque glabris, ramulis in sicco subatris vel atro-brunneis, ultimis 2.5–3 mm. diametro novellis plus minusve adpresse ferrugineo-pubescentibus; foliis ellipticis vel elliptico-ovatis, acuminatis, basi late acutis vel rotundatis, coriaceis, rigidis, utrinque subconcoloribus vel subtus paullo pallidioribus, subnitidis vel opacis, in sicco olivaceis vel atro-olivaceis, 8–14 cm. longis, 4–8 cm. latis, glabris, vel utrinque conspersissime breviter adpresse subalbido-pubescentibus glabrescentibus; nervis primariis utrinque 3, subtus elevatis, perspicuis, curvatis vel curvato-adscendentibus, obscure arcuato-anastomosantibus; petiolo crasso, 1–2 cm. longo, glabro vel consperse subadpresse subferrugineo-pubescenti, alabastris axillaribus (quoad visis) adpresse ferrugineo-pubescentibus; inflorescentiis terminalibus, amplis, cymoso-paniculatis, pedunculatis, 8–11 cm. latis, apertis, multifloris, pedunculo 2–3 cm. longo, ramis inferioribus 4–6 cm. longis, patulis, partibus vetustioribus glabris vel glabrescentibus, in sicco subatris, partibus junioribus breviter consperse subadpresse pubescentibus; floribus albidis, pedicellis 1–1.5 mm. longis, breviter adpresse cinereo-pubescentibus; calycibus plus minusve urceolatis, 2 mm. longis, subdense breviter adpresse cinereo- vel subferrugineo-pubescentibus, dentibus 4, brevissimis, acutis, vix 0.5 mm. longis; petalis oblongis, circiter 3 mm. longis et 1.3 mm. latis, acutis, extus brevissime conspersissime adpresse pubescentibus; filamentis glabris, petalis aequilongis; antheris 1.5 mm. longis; stylo cylindraco, 2 mm. longo, obscure longitudinaliter striato-sulcato, glabro, stigmate punctiformi vel brevissime 2-lobato.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2484 (TYPE), 3268, July 1928 and August 1931, altitude 1400–1500 m.

The alliance of this species is clearly with *Cornus Wilsoniana* Wang., which is represented by specimens from Hupeh and Kwangtung. It differs in its much larger, thicker, differently shaped, glabrous or nearly glabrous leaves, which are of about the same color on both surfaces, olivaceous or atro-olivaceous when dry, not pale as in Wangerin's species, the primary reticulations being evident, especially beneath, these being slender and obscure or even obsolete in *Cornus Wilsoniana* Wang.

Var. *impressinervis* var. nov.

A typo differt foliis angustioribus (7–12 cm. longis, 3–4 cm. latis) graciliter acuminatis, nerviis primariis supra impressis, inflorescentiis minoribus (5–6 cm. latis), floribus paullo majoribus.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2484, August 1940, a tree 8–10 m. high, altitude 1500 m.

Additional material may well prove that this form, here placed as a variety, may be worthy of specific rank.

ERICACEAE

Lyonia annamensis (Dop) comb. nov.

Pieris annamensis Dop in Lecomte, Fl. Gén. Indo-Chine 3: 726, f. 82, 4-10. 1930.

Poilane 3574 in the herbarium of the Arnold Arboretum, named by Dr. Dop, is apparently an isotype (the collector but not the number is cited in the original description). It is in all respects a *Lyonia* (*Xolisma*) for those who retain this as a generic segregate from *Pieris*.

Lyonia chapaensis (Dop) comb. nov.

Pieris chapaensis Dop in Lecomte, Fl. Gén. Indo-Chine 3: 726. 1930.

INDO-CHINA, Tonkin, Chapa, *Pételot* 3214, May 1931, altitude about 1400 m. The type was from the general vicinity of Chapa.

Dr. Dop records two other species of *Pieris* from Indo-China. *P. ovalifolia* D. Don is *Lyonia ovalifolia* (D. Don) Drude (*Xolisma ovalifolia* Rehd.), a species very widely distributed in Asia, while *Pieris langbianensis* A. Cheval. ex Dop op. cit. 728 is apparently a *Lyonia*; I have seen no material representing the latter species.

Rhododendron oxyphyllum Franch. Jour. de Bot. 12: 264. 1898; Hutch. in Sp. Rhod. 621. 1930.

INDO-CHINA, Tonkin, Chapa, Lo Qui Ho Peak, *Pételot* 2343, April 1938, alt. 2200 m. Yunnan, Kwangsi, and Siam.

This specimen, with entirely glabrous ovaries, peculiarly simulates another collection from Chapa, *Pételot* 6260, that I have referred to *Rhododendron laoticum* P. Dop, ex descr., but which has very densely pubescent ovaries. Dop describes the corolla lobes of this as *linear* and 2 cm. long, but does not indicate their width. This is probably an error, as *linear* petals scarcely occur in *Rhododendron*. In *Pételot* 6260 the corolla lobes are oblong, about 2 cm. long and 10–12 mm. wide.

OLEACEAE

Jasminum trineuron Kobuski, Brittonia 4: 167. 1941.

INDO-CHINA, Tonkin, Bac Giang Province, Minh Le, *Pételot* 2524, Feb. 1938, det. Kobuski. Type from Burma, the species also in Hainan.

***Linociera macrothyrsa* sp. nov.**

Arbor parva, circiter 5 m. alta, glabra vel subglabra, ramis pallide brunneis, glabris, conspersissime lenticellatis, ramulis ultimis subcastaneis, minutissime subfurfuracei-lepidotulis; foliis amplis, chartaceis vel subcoriaceis, oblongo-ellipticis, 12–22 cm. longis, 4–8 cm. latis, integerrimis, in sicco brunneis vel pallide olivaceo-brunneis, utrinque subconcoloribus, glabris vel junioribus supra minutissime lepidotulis, breviter obtuseque acuminatis, basi acutis, late acutis vel leviter decurrentibus, subtus secus costam nervosque minute verruculosus, vetustioribus supra uniformiter minutissime verruculosus; nervis primariis utrinque circiter 12, subpatulis, distantibus, versus marginem curvatis, obscure arcuato-anastomosantibus, reticulis laxis, cum nervis subtus satis distinctis; petiolo 3–3.5 cm. longo minute sublepidoto glabrescenti; inflorescentiis axillaribus, longe pedunculatis (pedunculo 3.5–6 cm. longo), paniculatis, cum pedunculis 13–18 cm. longis, glabris vel partibus junioribus obscurissime breviter pubescentibus, ramis primariis oppositis, paucis, patulis, longioribus 3.5–5 cm. longis; floribus subaxe dispositis, plerumque longe (3–5 mm.) pedicellatis, bracteis lanceolatis, 3–5 mm. longis, lanceolatis, vel inferioribus quoad visis oblanceolatis, foliaceis, ad 1.5 cm. longis et 2.5 mm. latis; floribus ♂ et ♀; sepalis oblongo-ovatis, obtusis acutis vel leviter acuminatis, circiter 1 mm. longis, margine breviter ciliatis, ceteroquin glabris; petalis subliberis vel deorsum minute connatis, ellipticis vel oblongo-ellipticis, glabris, 3–4 mm. longis, 1.5–2 mm. latis, sursum haud angustatis, apice rotundatis; filamentis brevissimis 0.5 mm. longis, crassis, antheris ellipticis vel oblongo-ellipticis, 2 mm. longis; ovario glabro, anguste ovoideo; stylo vix 1 mm. longo.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2690, August 1940, a white flowered tree about 5 m. high in open forests, altitude about 1500 m.

This species is characterized by its large, long-petioled leaves, its ample, long-peduncled, open panicles, and its unusually large flowers. Staminate and perfect flowers occur in the same inflorescences, there being no differences between them except in the absence of the ovary in the former. By Gagnepain's arrangement of the Indo-Chinese species, it falls in the group with *Linociera macrophylla* Wall., but it is remote from that species, both as represented by the published descriptions and by many specimens available for comparison from India, Siam, Indo-China, and China.

***Linociera subcapitata* sp. nov.**

Frutex vel arbor parva, glaberrima, ramis pallide brunneis, teretibus, obscure lenticellatis, ramulis ultimis circiter 1.5 mm. diametro, plus minusve sulcatis; foliis inter minora, ellipticis vel ovato-ellipticis, integerrimis, 6–9 cm. longis, 2.5–4 cm. latis, subcoriaceis, breviter subacute vel subobtuse acuminatis, basi rotundatis vel latissime acutis, in sicco haud verruculosus, supra brunneis, nitidis, subtus paullo pallidioribus; nervis primariis utrinque circiter 8, subpatulis, gracilibus, haud perspicuis, circiter ad marginem arcuato-anastomosantibus, reticulis laxis, obscuris; petiolo 7–10 mm. longo; inflorescentiis axillaribus, solitariis, pedunculo 2.5–3.5 cm. longo, floribus ad apice dense subcapitatim confertis capitulum 5–7 mm. diametro formanti-

bus, vel sursum dichotome ramosis, ramis binis 4–8 mm. longis singuli capitulum ferentibus; floribus sessilibus vel brevissime pedicellatis, confertis; sepalis suborbiculari-reniformibus, latissime rotundatis, circiter 1.5 mm. longis et 2 mm. latis; petalis fere liberis, ellipticis vel oblongo-ellipticis, sursum haud angustatis, apice late rotundatis, circiter 3 mm. longis et 1.5 mm. latis; staminibus haud visis; ovario ovoideo, glabro, stylo circiter 1 mm. longo; bracteis coriaceis, oblongo-ovatis, 1.5–1.8 mm. longis, acutis vel acuminatis, bracteolis similibus sed brevioribus.

INDO-CHINA, Langson Province, Massif du Mau Son, *Pételot* 1720, January 1925, altitude about 1200 m.

This species is remote from all of those admitted for Indo-China by Gagnepain, and is strongly characterized by its flowers being sessile or subsessile and crowded into small depressed-globose heads at the tip of the elongated simple peduncle, or arranged in two similar heads where the inflorescences are branched. The specimen is just beyond anthesis, but I was fortunate in finding in one of the heads a single flower from which it was possible to describe the petals; the stamens had fallen.

In connection with Gagnepain's interpretation of *Linociera cambodiana* Hance, it is suspected that he has included in his description some material that does not belong with Hance's species. Hance states that the leaves on his type were 2½ to 3 inches long; an examination of his type (*Pierre* from Phy Kok Island) in the British Museum herbarium shows them to vary from 6 to 11 cm. by 2 to 3.5 cm. Gagnepain describes the leaves as being 12 to 20 cm. long and 3 to 7 cm. wide.

GENTIANACEAE

Gentiana cephalantha Franch. in Hemsl. Jour. Linn. Soc. Bot. **26**: 125. 1890; Marq. Bot. Mag. **159**: t. 9468. 1936, Kew Bull. **1937**: 141. 1937.

INDO-CHINA, Tonkin, Chapa, Massif de Fan Tsi Pan, *Pételot* 3666, February 1929, alt. 1800 m. Szechuan, Yunnan, and northern Burma.

APOCYNACEAE

Aganosma grandiflora sp. nov.

Frutex scandens, ramulis junioribus inflorescentiisque exceptis glaber, ramis teretibus, glabris, subatris, ramulis ultimis 1.5–2 mm. diametro, conspersissime adpresse pubescentibus glabrescentibus; foliis oblongis vel oblongo-ellipticis, chartaceis, 5–7 cm. longis, 2–2.5 cm. latis, in sicco olivaceis, subnitidis, subtus paullo pallidioribus, breviter acute acuminatis, basi acutis vel late acutis, nervis primariis utrinque 10–12, gracilibus, haud perspicuis, obscure arcuato-anastomosantibus, reticulis subobsoletis; petiolo 5–6 mm. longo, glabro; inflorescentiis terminalibus, subcymosis, paucifloris (floribus 6–10), cum floribus magnis apertis, 8–10 cm. longis, 7–10 cm. latis, breviter pedunculatis vel e basi ramosis, plus minusve adpresse subcinereo-pubescentibus, ramis primariis paucis, subpatulis, ad 3 cm. longis; floribus albidis, circiter 4 cm. longis, pedicellatis; calycis lobis subpatulis, lanceolatis, acuminatis vel anguste acutis, circiter 12 mm. longis et 3.5 mm. latis, utrinque dense subcinereo-puberulis; corollae tubo extus puberulo, circiter 11 mm. longo, paullo supra basim leviter inflato et 4 mm. diametro, sursum angustato; lobis in partibus expositis puberulis et intus circa basim subhirsutis, ceteroquin glabris, circiter 2.5 cm. longis et 9–12 mm. latis,

obtusis vel subacutis, plus minusve inaequilateralibus; antheris lanceolatis, acuminatis, circiter 5 mm. longis; disco cylindrico, glabro, subcarnoso, crenato, circiter 1.5–2 mm. longo et 1.5 mm. diametro.

INDO-CHINA, Tonkin, near Than Moi, *Pételot* 2447, May 12, 1938, a liana growing on calcareous formations, flowers white.

A species characterized among its congeners, *Aganosma calycina* A. DC., *A. Schlechterianum* Lév. as interpreted by Tsiang (*Sunyatsenia* 4: 31. 1939), and allied species, by its large flowers, the corollas just before the petals spread being 2.5 cm. long. Among the Indo-Chinese species its alliance is with *A. Harmandiana* Pierre and *A. siamensis* Craib, but it is clearly distinct from both.

Melodinus brachyphyllus sp. nov.

Frutex scandens, magnus, ramulis inflorescentiis et foliis, praesertim subtus, molliter pubescentibus, ramis teretibus, subcastaneis, leviter pubescentibus, ramulis ultimis dense breviter pubescentibus, 1.5–2 mm. diametro; foliis parvis, ellipticis vel oblongo-ellipticis, coriaceis, 3.5–5 cm. longis, 1.5–2.5 cm. latis, breviter subobtusae acuminatis, basi acutis, supra olivaceis, subconspersae pubescentibus, subtus pallidioribus, dense molliter pubescentibus; nervis primariis utrinque 6–7, haud perspicuis, subtus leviter elevatis; petiolo pubescenti, 4–6 mm. longo; inflorescentiis terminalibus et in axillis superioribus, subcymosis, paucifloris, dense molliter pubescentibus, cum floribus 5–6 cm. longis, pedicellis 5–6 mm. longis, bracteis oblongo-lanceolatis, pubescentibus, 3–4 mm. longis, bracteolis binis, anguste oblongis, subobtusis, extus dense pubescentibus, ad 3 mm. longis, circiter 1 mm. latis; sepalis extus dense molliter pubescentibus, intus glabris, ellipticis vel oblongo-ellipticis, obtusis, 3.5–4 mm. longis, 1.8–2 mm. latis; corollae tubo cylindrico, 1.6 cm. longo, extus pubescenti (basi excepta), lobis subrhomboideis, circiter 1.5 cm. longis et 1 cm. latis, obtusis, deorsum angustatis, partibus expositis pubescentibus ceteroquin glabris; squamis 10, oblongis, plus minusve pubescentibus, circiter 1.5 mm. longis; antheris lanceolatis, acuminatis, 1.8 mm. longis, filamentis circiter 3–4 mm. supra basim tubi insertis, tubo hic haud inflato; ovario anguste ovoideo, glabro, stylo glabro, circiter 3 mm. longo.

INDO-CHINA, Langson Province, between Dong Mo and Than Moi, *Pételot* 2438, April 28, 1938, a large liana.

This species is characterized by its indumentum as well as by its unusually small leaves. It has the corolla throat scales ten, two opposite the base of each petal, thus falling in the group with *Melodorum erianthus* Pitard, but otherwise it is not closely allied to that species.

ASCLEPIADACEAE

Gymnema alterniflorum (Lour.) Merr. Trans. Am. Philos. Soc. II. 24(2): 318. 1935, *cum syn.*

Apocynum alterniflorum Lour. Fl. Cochinch. 168. 1790.

Gymnema affine Decaisne in DC. Prodr. 8: 622. 1844; Tsiang, *Sunyatsenia* 2: 196. 1934.

INDO-CHINA, Tonkin, Bac Giang Province, near Bo Ha, *Pételot* 2435, Nov. 6, 1938; Thoi Nguyen Province, route from Hanoi to Thoi Nguyen, *Pételot* 2421, Nov. 12, 1939, in thickets and hedges. Chekiang and Fokien to Formosa, Kwangtung, and Hainan.

Gymnema formosanum Warb. Repert. Sp. Nov. **3**: 307. 1907, type from Formosa, should be compared with this species.

Toxocarpus Gagnepainii Tsiang, Sunyatsenia **4**: 84. f. 26. 1939.

INDO-CHINA, Annam, Dalat, *Squires* 879. Known only from the type collection.

Toxocarpus Klossii S. Moore, Jour. Nat. Hist. Soc. Siam **4**: 149. 1921.

INDO-CHINA, Annam, Tour Cham, *Boden-Kloss*, herb. Brit. Mus. From the description a very different species than the preceding one.

Toxocarpus ovalifolius Tsiang, Sunyatsenia **2**: 193. t. 35. 1934.

INDO-CHINA, Tonkin, Bac Giang Province, near Bo Ha. *Pételot* 2434, Nov. 6, 1938. Previously known only from Hainan.

CONVOLVULACEAE

Ipomoea cairica (L.) Sweet, Hort. Brit. 287. 1827.

Convolvulus cairicus Linn. Syst. ed. 10. 922. 1759.

Ipomoea palmata Forsk. Fl. Aeg.-Arab. 43. 1775; C. B. Clarke in Hook. f. Fl. Brit. Ind. **4**: 214. 1883.

INDO-CHINA, Tonkin, Hanoi, *Pételot* 3673, Oct. 1924, in hedges.

Introduced here as it is in various other tropical countries, probably native of the Old World tropics.

Erycibe subspicata Wall. List. no. 1392. 1829, *nomen nudum*; G. Don, Gen. Syst. **4**: 392. 1838; C. B. Clarke in Hook. f. Fl. Brit. Ind. **4**: 181. 1883; Prain, Jour. As. Soc. Bengal **73**(2): 15. 1904, *in nota*.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 5972, 6605, Oct. 11, 1936, and Nov. 1, 1940, alt. 150–500 m.

These specimens are in all respects the same as *Henry* 12514, 12739, 13430 from Yunnan, determined by Prain, Jour. As. Soc. Bengal **73**(2): 15. 1904, *in nota* sub *Erycibe albiflora* Hall. f. as representing Wallich's species. Additional Yunnan specimens are *Wang* 79579, 80120, 80121, 80773, 80834 collected in 1935–36. Assam, Khasia, and Burma.

VERBENACEAE

Callicarpa heterotricha sp. nov.

Arbor 7–8 m. alta, ramulis ultimis 4–5 mm. diametro, densissime implicato-pubescentibus, pilis brevioribus numerosissimis substellatis, paucioribus intermixtis elongatis, depauperato-plumosis, subflaccidis, ad 3 mm. longis, indumento subferrugineo; foliis chartaceis, integris, obovatis vel oblongo-obovatis, acutis vel breviter acuminatis, basi acutis vel leviter decurrenti-acuminatis, 15–20 cm. longis, 6.5–10 cm. latis, supra olivaceis, ad costam nervosque dense pubescentibus, indumento ut in ramulis junioribus, parenchymate pilis sparsis brevibus stellatis vel depauperato-plumosis insperso, subtus pallidioribus sed haud albidis, ad costam nervosque densissime, in parenchymate manifeste sed haud dense stellato-pubescentibus, pilis superficiem haud occultantibus; nervis primariis utrinque 9–11, utrinque perspicuis, subtus elevatis, curvatis, ad marginem arcuato-anastomosantibus, reticulis primariis subparallelis; petiolo 1.5–2.5 cm. longo, indumento ut in ramulis junioribus; inflorescentiis multifloris, cymosis, pedunculatis, 8–12 cm. longis dense villosis, pilis stellatis et depauperato-plumosis intermixtis; calycibus obovoideis, subtruncatis vel obscurissime 5-dentatis, extus dense pallide pubescentibus, circiter 1 mm. longis; corolla 3 mm. longa,

sursum ampliata, tubo 2 mm. longo, lobis 4, suborbiculari-obovatis, late rotundatis, 1 mm. longis; staminibus 4, filamentis gracilibus, glabris, longe exsertis, 6 mm. longis; antheris ellipsoideis, 1 mm. longis; ovario globoso, glabro, stylo quam filamentis paullo longiore.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *Pételot* 2608, July 2, 1940, in humid forests, altitude about 600 m.

By Dr. Dop's key this falls with *Callicarpa arborea* Roxb. as interpreted by him, yet it differs from Roxburgh's species in so many striking characters, and for that matter all other Chinese and Indo-Malaysian species known to me, that I am constrained to describe it as new. The very dense indumentum on the branchlets, parts of the inflorescences, petioles, and on the midribs and lateral nerves on both surfaces of the leaves is made up of short crowded stellate hairs and much longer subplumose ones, the latter often 3 mm. in length, and usually with very few, short, lateral branchlets, these lateral branchlets scarcely stellate in arrangement. The shorter stellate hairs on the parenchyma on the lower surface by no means conceal the latter, the more or less scattered stellate hairs on other than the midrib and lateral nerves scarcely touching each other.

RUBIACEAE

Hedyotis effusa Hance, Jour. Bot. **17**: 11. 1879.

INDO-CHINA, Laos, Cammon Province, Pak Hin Boum, *Pételot* 2508, Dec. 1930. Southeastern China.

The material closely approximates a series of Kwangtung specimens representing Hance's species. I am unable to refer it to any of the Indo-Chinese species described by Pitard.

Hedyotis tetragonalis (Korth.) Walp. Ann. **2**: 769. 1852; Valetton, Bot. Jahrb. **44**: 543. 1912, *descr. ampl.*; Merr. & Metc. Lingnan Sci. Jour. **16**: 400. 1937.

Diplophragma tetragonale Korth. Nederl. Kruidk. Arch. **2**: 149. 1851.

Hedyotis Parryi Hance, Ann. Sci. Nat. IV. Bot. **18**: 221. 1862.

Oldenlandia tetragonalis Merr. Pap. Michigan Acad. **23**: 193. (1937) 1938.

Oldenlandia subdivaricata Drake, Jour. de Bot. **9**: 211. 1895; Pitard, in Lecomte, Fl. Gén. Indo-Chine **3**: 124. 1922, syn. nov.

Hedyotis subdivaricata Drake ex Pitard, l.c. in syn.

INDO-CHINA, Tonkin, Phuc Yen Province, Phu Lo and Phu Da Phuc, *Pételot* 2492, 2497, May and June 1936, in dry fallow rice paddies. Kwangtung and Hainan to Borneo and Sumatra.

I am unable to distinguish Drake's species from the forms described earlier by Korthals from Borneo and by Hance from Kwangtung Province, China.

Hedyotis nigrescens sp. nov. § *Diplophragma*.

Frutex, ramis teretibus, glabris, pallidis, ramulis ultimis subteretibus vel obscure 4-angulatis, subdense brevissime pubescentibus; foliis numerosis, oblongis vel oblongo-lanceolatis, 2-4 cm. longis, 5-10 mm. latis, breviter subapiculato-acuminatis, basi acutis vel subobtusis, sessilibus vel brevissime (1 mm.) petiolatis, chartaceis, supra in sicco nigrescentibus, glabris vel primo ad costam deorsum leviter pubescentibus, subtus paullo pallidioribus, brunneis, ad costam nervosque breviter pubescentibus, nervis primariis utrinque circiter 5, gracilibus, haud perspicuis, curvato-adscendentibus, ob-

scure arcuato-anastomosantibus, reticulis subobsoletis; stipulis laciniatis, extus leviter pubescentibus, 3–4 mm. longis, laciniis 5–10, gracilibus, interioribus longioribus, ad 2–2.5 mm. longis, exterioribus gradatim brevioribus; floribus 4-meris, fasciculatis, fasciculis terminalibus, haud pedunculatis, 6–10 mm. diametro, plerumque paucifloris; pedicellis glabris, ad 1 mm. longis; bracteolis 2 mm. longis, fimbriatis, membranaceis; floribus extus (sepalis exceptis) glabris, sepalis 4, lanceolatis, acuminatis, 2 mm. longis, quam capsulis longioribus, obscure brevissime hispidis; corollae tubo cylindrico, 2.5 mm. longo, 1 mm. diametro, intus sursum barbato, lobis 4, linearis vel anguste lineari-oblongis, recurvatis, 2 mm. longis, 0.5 mm. latis; filamentis brevibus, glabris, antheris circiter 1 mm. longis; stylo (basi apiceque exceptis) breviter pubescente, gracili, 4.5 mm. longo; stigmatibus 2, anguste oblongis, 1 mm. longis; capsulis glabris, obovoideo-globosis, ad 1.5 mm. longis, sepalis quam capsulis longioribus persistentibus, apicibus intra lobis haud protrusis, tarde loculicide dehiscentibus; seminibus numerosis.

INDO-CHINA, Tonkin, Langson Province, Thanh Moi, *Pételot* 2521, May 1938, in shrubby savannas.

A species with the general habit and much the appearance of the Philippine *Hedyotis Bartlingii* Merr., but with its persistent sepals distinctly longer than the glabrous, not pubescent, capsules.

Ixora cephalophora, sp. nov. § *Euixora*, *Chlamydanthus*.

Frutex glaber, ramulis ultimis circiter 3 mm. diametro, internodiis 5–7 cm. longis; foliis anguste oblongis vel oblongo-oblanco-latis, chartaceis, apice obtusis vel breviter late obtuseque acuminatis, basi acutis, 20–25 cm. longis, 4–6.5 cm. latis, in sicco supra subolivaceis, nitidis, subtus paullo pallidioribus; nervis primariis utrinque circiter 10, gracilibus, curvatis, anastomosantibus, subtus elevatis, reticulis laxis; petiolo 1–2 cm. longo; stipulis suborbiculari-ovatis, circiter 5 mm. diametro, abrupte graciliter apiculatis, apiculis 3 mm. longis; inflorescentiis terminalibus, myrianthis, sessilibus, floribus densissime confertis, capitulum densum formantibus, circiter 7 cm. longis et 9 cm. latis, ramis primariis vix 1 cm. longis; floribus albidis, densissime confertis, in triadibus dispositis, lateralibus brevissime (1–2 mm.) pedicellatis, medianis sessilibus; bracteolis submembranaceis, lanceolatis, acuminatis, 2.5–4 mm. longis, 1.5 mm. latis, quam calycis tubo multo longioribus; calycis tubo circiter 2 mm. longo, lobis submembranaceis, oblongo-lanceolatis vel lanceolatis, acuminatis, 4–5 mm. longis, 2 mm. latis; corollae tubo gracili, 2 cm. longo, lobis 4, ellipticis, intus glabris, rotundatis, 6 mm. longis et 4 mm. latis; filamentis brevissimis, antheris anguste oblongis, 3 mm. longis; stylo gracili glabro.

INDO-CHINA, Tonkin, Langson Province, Thanh Moi, *Pételot* 2502, April 28, 1938, a shrub with white flowers in shrubby savannas.

A strongly marked species, characterized by its dense, terminal, sessile, globose heads of very numerous flowers, the primary branches of the inflorescence being greatly shortened, the branches and very short branchlets densely crowded, the lanceolate bracteoles and sepals much longer than the calyx tubes. Its alliance is clearly with *Ixora multibracteata* Pearson of Burma, Siam, the Malay Peninsula, and Sumatra. Judging from Bremekamp's description, *Ixora capituliflora* Bremek. Jour. Bot. 75: 297, 1937, is also closely allied to this Indo-Chinese form.

Ixora flexilis Pierre ex Pitard in Lecomte, Fl. Gén. Indo-Chine **3**: 315. 1924, *in syn.*
Ixora diversifolia Wall. var. *flexilis* Pitard, l.c. descr.

INDO-CHINE, Tonkin, Bac Giang Province, Pho Vi. *Pételot* 2490, June 3, 1936, in humid forests.

As *Ixora diversifolia* R. Br. is interpreted by Bremekamp, Jour. Bot. **75**: 321. 1937, and as he in general limits species, I see no reason why the Indo-Chinese form with very short pubescent inflorescences and slightly pubescent corollas, the form figured by Pierre in his lithographed dissections of *Ixora flexilis* Pierre, should be placed with *Ixora diversifolia* R. Br. as a variety as Pitard did.

Myrioneuron effusum (Pitard) comb. nov.

Myrioneuron nutans Wall. var. *effusa* Pitard in Lecomte Fl. Gén. Indo-Chine **3**: 192. 1923.

A second collection of this species from the type locality, Mount Bavi, *Pételot* 2520, in flower, seems to justify the proposal of this form as a species; Balansa's specimen, on which Pitard's ample description was based, was in fruit. The flowers are about 14 mm. long. Calyx tube about 3 mm. long, the lobes lanceolate, long and slenderly acuminate, at anthesis 6–7 mm. long, in young fruit 1 cm. long, more or less pubescent outside. Corolla tube cylindric, 1 cm. long, the lobes oblong-ovate, acute, 2 mm. long, these and the tube short-pubescent outside, the tube villous within. Filaments glabrous, 1.5 mm. long, the anthers linear-lanceolate, 3 mm. long, their tips slightly exserted. Style arm 4 mm. long.

Psychotria siamica (Craib) Hutch. in Sargent, Pl. Wils. **3**: 415. 1916.

Cephaelis siamica Craib, Kew Bull. **1911**: 395. 1911.

Psychotria Thorelii Pitard in Lecomte, Fl. Gén. Indo-Chine **3**: 364. 1934, syn. nov.

Pitard's type was from Paklai, Laos, Indo-China, a specimen collected by *Thorel* that I have not seen. This strongly marked species is clearly represented by *Pételot* 2516 from Langson Province, and 5713 from Thai Nguyen Province, Tonkin. I can detect no constant differences between *Psychotria Thorelii* Pitard and the earlier *P. siamica* (Craib) Hutch. The species extends from Siam to Indo-China, Yunnan, and Kwangsi.

Spiradiclis caespitosa Blume, Bijdr. 795. 1826; Kurz, Jour. As. Soc. Bengal **46**(2): 129. 1877; Hook. f. Fl. Brit. Ind. **3**: 76. 1880.

INDO-CHINA, Tonkin, Massif de Pia Quac, near Nam Kep, *Pételot* 713, July 1922, on schistose cliffs, alt. 700 m. Java and Martaban.

This specimen agrees with the inadequate descriptions of Blume's species and probably represents it; the type was from Java and I have seen no specimens representing the species. Hooker f. admits it on the basis of Kurz's Martaban record, but no species of the genus has been recorded from either Siam or the Malay Peninsula.

Spiradiclis leptobotrya (Drake) Pitard, var. ***longiflora*** var. nov.

A typo (haud viso) differt floribus distincte longioribus, circiter 5 mm. longis, corollae tubo 4 mm. longo, lobis 1.3 mm. longis, petiolis paullo longioribus, (ad 2.5–3 cm.) ramulis compressis vel sulcatis, haud 4-angulatis.

INDO-CHINA, Tonkin, Hoa Binh Province, Muong Thon, route from Hanoi to Hoa Binh, *Pételot* 6405, Oct. 1937, in open forests.

Pitard's ample and detailed description applies rather well to the cited specimen except in the characters indicated. The type is *Balansa* 2635 from Cho-bo, Tonkin. The corolla lobes are described as 0.3–0.4 mm. and the tube as 1.5–2 mm. long, the form I have indicated as var. *longiflora* having flowers twice as long. Pitard's figure, 9, 7–9, includes an illustration of a mature flower, and he describes and illustrates the corolla as pubescent outside, although in Drake's original description it is indicated as glabrous. The species is known only from the original collection.

CAPRIFOLIACEAE

Viburnum erubescens Wall. var. **neurophyllum** Hand.-Maz. Symb. Sin. **7**: 1033. 1936.

INDO-CHINA, Tonkin, Bac Giang Province, Lang Met, *Pételot* 1814, May 1925. The variety in Yunnan, the species extending from the Himalayan region to Ceylon, Yunnan, and Szechuan.

VALERIANACEAE

Valeriana Jatamansi Jones, As. Res. **2**: 405, 416. 1790; Hand.-Maz. Act. Hort. Gothob. **9**: 171. 1934.

INDO-CHINA, Tonkin, Chapa, Massif de Song ta Van, *Pételot* 2096, April 1936, in open forests, alt. 1900 m. Himalayan region to Yunnan, Szechuan, and Hupeh.

When first studied, this number and *Pételot* 5934, described below as var. *glabra*, were indicated as representing a new species. I am now convinced that it cannot be separated from the rather widely distributed *Valeriana Jatamansi* Jones, synonyms of which are *V. spica* Vahl (1806), *V. Wallichii* DC. (1832), *V. Harmsii* Graebn. (1898), and *V. Mairei* Briq. (1914). The indumentum on this specimen is like that on typical Asiatic material of Jones' species, but the leaves are rather distinctly undulate-crenate or even crenate-dentate.

Var. **glabra**, var. nov.

A typo differt partibus omnibus glaberrimis, foliis irregulariter sat grosse crenato-dentatis.

INDO-CHINA, Tonkin, Chapa, Lo Qui Ho to Ta Pinh, *Pételot* 5934, April 1936, along the trail near a cascade, alt. 1700 m.

The only species hitherto recorded from Indo-China is the very different *Valeriana Hardwickii* Wall.

CUCURBITACEAE

Alsomitra integrifoliola (Cogn.) Hayata, Jour. Col. Sci. Univ. Tokyo **30**(1): 121. 1911; Ic. Pl. Formos. **1**: t. 38–39. 1911, **2**: 40. 1912; Cogn. Pflanzenr. **66** (IV. 275¹): 17. 1916.

Gynostemma integrifoliolum Cogn. in DC. Monog. Phan. **3**: 916. 1881.

Gynostemma elongatum Merr. Philip. Jour. Sci. **3**: Bot. 267. 1908.

Hemsleya elongata Cogn. Pflanzenr. **66** (IV. 275¹): 26. 1916.

Alsomitra tonkinensis Gagnep. Bull. Mus. Hist. Nat. Paris **24**: 372. 1918; Lecomte, Fl. Gén. Indo-Chine **2**: 1088. f. 126. 1921

INDO-CHINA, Tonkin, Ninh Binh Province, Cho Ganh, *Pételot* 1198, November 1923. Philippines, Formosa, and Hainan.

Cogniaux erroneously excluded *Gynostemma integrifoliolum* Cogn. as a synonym of *Alsomitra integrifoliola* Hayata. In Philip. Jour. Sci. **7**: Bot.

353. 1912, I called attention to the fact that *Gynostemma elongatum* Merr. is a synonym of *Alsomitra integrifoliola* Hayata and that the "fruits" of *Gynostemma integrifoliolum* Cogn. as described by Cogniaux were merely globose galls infested with insect larvae. Although I have seen no authentic material representing *Alsomitra tonkinensis* Gagnep., I do not see how this can be distinguished from *A. integrifoliola* (Cogn.) Hayata from the published data appertaining to Gagnepain's species.

COMPOSITAE

Cirsium involueratum DC. Prodr. **7**: 639. 1837.

Cnicus involucratus Wall. ex DC. l.c. in syn.; Clarke in Hook. f. Fl. Brit. Ind. **3**: 362. 1881.

INDO-CHINA, Tonkin, Chapa, *Pételot* 6289, July 1935, a coarse herb 2–2.5 m. high, alt. 1500 m. Himalayan region to Yunnan, if I have correctly determined *Henry* 9083 and *Forrest* 15153.

Gagnepain admits three species of *Cnicus* as occurring in Indo-China, *C. japonicus* Max., *C. Leducii* Franch., and *C. chinensis* Maxim., this record adding a fourth species to the general group.

Eupatorium odoratum Linn. Syst. ed. 10. 1205. 1759; Gagnep. in Lecomte, Fl. Gén.

Indo-Chine **3**: 506. 1924; Kerr in Craib, Fl. Siam. Enum. **2**: 249. 1936.

This tropical American species was included by Gagnepain on the basis of Siam collections, but he had no material from Indo-China. Kerr, however, speaks of it as now widely distributed in Assam, Burma, Siam, the Malay Peninsula, and French Indo-China. It has recently been collected along roads at Co Dong, Sontoy Province, Tonkin, and the collector mentions it as of probably recent introduction and as rapidly spreading, *Pételot* 2063, December 1935.

Youngia cineripappa (Babc.) Babc. & Stebb. Gen. Youngia 60. f. 13. 1937. (Carnegie Inst. Washington Publ. **484**).

Crepis cineripappa Babc. Univ. Calif. Publ. Bot. **14**: 325. 1928.

Crepis primulifolia Hook. f. Gen. Pl. **2**(1): 514. 1873, *nomen nudum*.

INDO-CHINA, Tonkin, Chapa, *Pételot* 2060 (det. Babcock) 6541, April 1925 and 1935, alt. 1500 m. Assam, Khasia, Yunnan, Szechuan, and probably Kweichow.

In recognizing *Youngia* as a generic segregate from *Crepis*, Babcock and Stebbins cite *Pételot* 1762 from Chapa as representing this species. *Crepis japonica* (Thunb.) Benth., a widely distributed weed also occurring in Indo-China (Fl. Gén. Indo-Chine **3**: 642. 1924), becomes *Youngia japonica* (Thunb.) DC.; Babc. & Stebb. op. cit. 94. f. 28. 1937.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

THE VEGETATIVE PROPAGATION OF EASTERN WHITE PINE AND OTHER FIVE-NEEDED PINES¹

CARL G. DEUBER

With one plate

WITH the recognition of the root-inducing properties of heteroauxin and a number of chemicals with similar physiological activity, a new interest in vegetative propagation of forest trees was stimulated. This has resulted in studies of root regeneration in cuttings of species heretofore reproduced only by seed and whose ability to form roots from stem pieces was little known. With at least one conifer, *Pinus radiata* Don (11), large nursery operations are in progress with the reproduction of superior stock by means of stem cuttings. In the United States and Canada considerable study has been given the rooting characteristics of eastern white pine (2, 3, 5, 6, 14, 17 and 23). These investigations have clarified a number of features of the root regeneration characteristics of eastern white pine cuttings, but have not progressed to a point where extensive propagation programs could be started with confidence that consistent and abundant rooting would result.

The cuttings of this species have been found to be relatively difficult to root. They root most readily when secured from very young seedlings, but in a very irregular manner or not at all when obtained from older trees. Applications of root-inducing chemicals usually hastened and increased the rooting of cuttings from seedlings, but have not given consistently beneficial results with those from older trees. Considerable periods of time are required for roots to form on cuttings from older trees. With dormant cuttings the period may be three to five months or more. In the propagating bench many cuttings die from drying out and they are very subject to decay. The rooting of white pine stem cuttings is still considered to be in an experimental stage requiring many additional facts as well as confirmation of previous findings to make vegetative propagation a reliable procedure in silviculture, in tree breeding or in forest pathology programs.

The present study deals with the rooting responses of many collections of eastern white pine cuttings and a lesser number from seven additional species of five-needled pines: *Pinus monticola*, *P. parviflora*, *P. flexilis*, *P. koraiensis*, *P. peuce*, *P. Cembra* and *P. Lambertiana*. The influence of the age of the parent trees from which the cuttings were obtained was

¹The experimental work was conducted at the Harvard Biological Laboratories and the Arnold Arboretum of Harvard University while the writer was in residence in 1940-41. Acknowledgement of thanks are extended to Professor A. B. Dawson and Professor K. V. Thimann for laboratory facilities and to Professor E. D. Merrill for the privilege of collecting material from the conifer collections in the Arnold Arboretum.

observed with shoots taken from trees 2 to 90 years old. Cuttings were collected from a number of plantations and the rooting responses of the cuttings of a number of individual trees were recorded. It has been previously observed (3) that considerable inherent variability in the ability of cuttings from certain individual trees to root may exist, so that any light upon associated characters of those trees which yield cuttings which root would be exceedingly useful. A very extensive series of auxin treatments was applied to the cuttings as well as trials of the effectiveness of treatments with sucrose and nitrogenous compounds. Observations on the influence of fungicides and dormancy-breaking chemicals were also made.

GENERAL METHODS OF PROCEDURE

The cuttings were collected in nurseries and plantations in Connecticut and Massachusetts, in the Arnold Arboretum of Harvard University, and one collection of white pine branches came from Wisconsin and one of sugar pine from California. In general, only lateral shoots of the current season's growth were taken from lower lateral branches. The cuttings were made to a length of 3 to 4 inches with snap-cut pruning shears. The propagating medium was fresh medium coarse sand in open central benches in warm greenhouses. One bench was equipped with electric coil heating units set to provide a temperature of 70° F. in the sand. Cheesecloth shades were provided to reduce the intensity of direct sunlight. The propagation conditions were excellent for cuttings that rooted readily and they permitted satisfactory survival of many collections of cuttings of adult pine trees for periods of five to eight months. The rooting responses of the cuttings were first inspected after they had been in the sand between two and three months.

ROOTING RESPONSES OF CUTTINGS FROM SEEDLINGS AND TRANSPLANTS

For some time it has been recognized that cuttings from seedlings of many trees root more readily than those from adult trees. Stoutemeyer (22) reviewed this subject in connection with a study of root formation in apple cuttings. The significance of the age factor to ease of rooting was shown to hold for various species, including eastern white pine, by Gardner (7). Thimann and Delisle (23) obtained rooting with cuttings of eastern white pine seedlings $\frac{1}{2}$ to 3 and 4 years old. Deuber (3) found that cuttings from eastern white pine seedlings 2 to 4 years old rooted most abundantly, those from trees 5 and 7 years rooted much less and those from trees 15, 25, 35 and 60 years old rooted in a very irregular manner. With cuttings from trees 5, 10, 15, 20 and 40 years old Snow (17) reported rooting with those from the three younger ages. It was hoped that additional study of the conditions required for the rooting of cuttings from young pines would result in more consistently high rooting responses and would shed light upon the procedures most suitable for cuttings from older trees.

In the present investigation the most complete series of cuttings from trees 2 to 7 years old from the same source and handled uniformly were

supplied by Mr. J. R. Brubaker of the Cheshire Nursery, Cheshire, Conn. One-half of the cuttings were treated with indolebutyric acid in talc (2 mg./gm.) just before being planted in mid-January. A second auxin treatment was given the non-rooted cuttings at the time of the first inspection. The data recorded in Table 1 give the progress in root formation at three periods during the six months the cuttings remained in the propagating bench. A series of typical rooted cuttings is illustrated in Plate 1.

TABLE 1.
ROOTING RESPONSES OF EASTERN WHITE PINE CUTTINGS FROM NURSERY STOCK
2 TO 7 YEARS OLD. PLANTED JAN. 13, 1941.

Type of shoot	Age of trees, Treatment	No. per group	Rooted after:		
			73 days	134 days	182 days
			%	%	%
2 years					
Terminal.....	Control	36	2.7	38.8	41.7
Terminal.....	I.B. in talc	36	50.0	61.1	63.9
3 years					
Terminal.....	Control	18	33.3	55.5	55.5
Terminal.....	I.B. in talc	18	50.0	61.1	72.2
Lateral.....	Control	40	15.0	62.5	67.5
Lateral.....	I.B. in talc	40	45.0	45.0	52.5
4 years					
Branch terminal.....	Control	20	10.0	10.0	10.0
Lateral, upper whorl.....	Control	30	3.3	26.6	43.3
Lateral, lower whorl.....	Control	36	19.4	58.3	86.1
5 years					
Branch terminal.....	Control	20	0	0	0
Lateral.....	Control	30	0	3.3	23.3
Lateral.....	I.B. in talc	30	3.3	23.3	43.3
6 years					
Branch terminal.....	Control	20	0	10.0	10.0
Lateral.....	Control	30	0	6.6	40.0
Lateral.....	I.B. in talc	30	13.3	43.3	63.3
7 years					
Branch terminal.....	Control	20	0	0	0
Lateral.....	Control	28	0	0	3.5
Lateral.....	I.B. in talc	28	0	7.1	28.5

The terminal shoots of 2- and 3-year old seedlings rooted satisfactorily, but the branch terminals of lateral branches from transplants 4 to 7 years old rooted very poorly or not at all. Another significant difference in the rooting responses between two types of cuttings was that between upper and lower whorl lateral shoots of 4-year old trees. Cuttings from the upper whorl of branches rooted 43.3 per cent and those from the lower whorl 86.1 per cent.

The cuttings from 3-year old seedlings were the most prompt in rooting. With cuttings of lateral shoots, sharply graduated decreases in rooting responses between cuttings from seedlings 2 to 6 years old did not occur. The rooting of cuttings from 7-year old transplants decreased markedly from those of the younger ages.

The auxin treatment of the cuttings both hastened root formation and increased the number that rooted in all but one instance, laterals of 3-year old stock. The most marked effect of the auxin treatments was with the 7-year old stock which rooted 3.5 per cent without treatment and 28.5 per cent when treated. Calculation of the χ^2 value for all the control groups compared with the auxin treated groups indicated that the influence of the auxin treatments was highly significant.

TESTS OF VARIOUS METHODS FOR TREATING THE CUTTINGS

At the end of March a large collection of cuttings was made from 6-year old seedlings growing in an old field. A variety of auxin treatments that had been tried with cuttings from adult trees was tested together with the influence of sucrose. These treatments and the rooting responses are recorded in Table 2. Most of the cuttings were pulled from the branches with a quick jerk so that a small heel of the bark of the previous season's growth remained attached to the stem bases. This method of preparing the cuttings was compared with cutting them off with a razor blade at the base of the current season's growth. The untreated control groups rooted 25 per cent when the cuttings were removed with a razor and 30 per cent when pulled off with a heel. A larger difference in favor of the cuttings with a heel was found when the cuttings were treated with indolebutyric acid in talc. Treatment of the cuttings with indolebutyric acid or α -naphthaleneacetic acid in talc dusts were of the same order of effectiveness in increasing the rooting of the cuttings above that of the controls. These treatments were particularly effective in hastening root formation.

Maximum rooting was secured when the cutting bases were placed in a solution of indolebutyric acid, 10 mg./l., for 3 hours. A similar treatment with α -naphthaleneacetic acid was just one-half as effective in inducing rooting. When the cuttings were placed in a 1.5 per cent solution of sucrose for 3 hours the rooting response was of the same order, 50 per cent, as the best treatment with indolebutyric acid in talc.

Solutions of auxins and sucrose were also employed with a modification of the vacuum method described by Butterfield and McClintock (1). Earlier trials in which pine cuttings were subjected to a vacuum in the presence of a solution of auxin did not prove satisfactory, nor did trials in which the cuttings were first subjected to a vacuum and then to pressure. In this experiment the cuttings were placed in a suction flask with auxin or sucrose solutions and a pressure of 1 atmosphere was applied from a cylinder of compressed nitrogen gas for 10 or 20 minutes. The pressure method for a 10-minute period was approximately as effective as the method in which cuttings stood in solutions of indolebutyric acid or

sucrose for 3 hours. When the cuttings were treated with a solution containing both indolebutyric acid and sucrose the rooting response was of the same order as that of the controls. This result occurred in both the static and pressure methods of treatment.

TABLE 2.
THE INFLUENCE OF VARIOUS TREATMENTS UPON THE ROOTING RESPONSES OF CUTTINGS OF EASTERN WHITE PINE TREES 6 YEARS OLD. PLANTED MARCH 30, 1941.

Type of shoot and Treatment	No. per group	Rooted after: 60 days	140 days
		(	(
Lateral shoots			
Control, pulled off with a heel	20	0	30.0
Control, cut with a razor	20	0	25.0
I.B. in talc, 2 mg./gm., pulled off with a heel	20	45.0	50.0
I.B. in talc, 2 mg./gm., cut with a razor	20	20.0	35.0
(Cuttings of remaining groups pulled off with a heel)			
Nap. in talc, 2 mg./gm.	20	45.0	45.0
I.B. in soln., 10 mg./l., 3 hrs.	20	15.0	60.0
I.B. in soln., 10 mg./l., with pressure, 10 min.	20	0	55.0
I.B. in soln., 10 mg./l., with pressure, 20 min.	20	5.0	35.0
Nap. in soln., 10 mg./l., 3 hrs.	20	10.0	30.0
Sucrose, 1.5% soln., 3 hrs.	20	5.0	50.0
Sucrose, 1.5% soln., with pressure, 10 min.	20	0	45.0
I.B. soln., 10 mg./l. + sucrose, 1.5% soln., 3 hrs.	20	0	35.0
I.B. soln., 10 mg./l. + sucrose, 1.5% soln., pres. 10 min.	20	0	25.0
I.B. in lanolin paste, 4 mg./gm., to stem bases	20	0	0
I.B. in lanolin emulsion, 0.2 mg./ml., to stem bases	20	0	0
I.B. in lanolin emulsion, 0.2 mg./ml., to buds	20	0	10.0
I.B. in lanolin emulsion to stem bases and to buds.	20	0	5.0
Branch terminal shoots			
Control	20	0	0
Toothpicks saturated with 95% alcohol	20	5	5.0
Toothpicks saturated with I.B. in alc., 10 mg./10 ml.	20	30.0	55.0
Toothpicks saturated with Nap. in alc., 10 mg./10 ml.	20	60.0	85.0

Application of indolebutyric acid in lanolin paste induced injury and early decay of the cutting bases. An emulsion of lanolin with indolebutyric acid prepared like colchicine emulsions, Warmke and Blakeslee (25), while not as injurious as lanolin paste, was not effective when applied to the stem bases, buds, or to both the stems and buds.

The large terminal shoots of lateral branches were induced to root and in relatively high percentages when sharpened ends of toothpicks previously soaked in concentrated alcoholic solutions of indolebutyric acid or α -naphthaleneacetic acid were inserted into the stems just above the base. This

technique was described by Romberg and Smith (15) for the thick root cuttings of pecan. The work of Snow (17) and other investigators of eastern white pine propagation have shown that lateral shoots root so much more readily than branch terminals on all but the youngest seedlings that branch terminal shoots were only rarely used in this investigation. The magnitudes of the rooting responses were such that additional study of the method is warranted.

The data of this experiment with cuttings of 6-year old trees afforded the best opportunity in this investigation to compare the effectiveness of various methods of treatment with auxins and sucrose. A favorable circumstance was the fact that the control cuttings had an inherent ability to root. Both dust and solution treatments with indolebutyric acid increased rooting; the dust applications with indolebutyric acid or α -naphthaleneacetic acid hastened root formation more than solution treatments. No particular advantage can be ascribed to the pressure method, its brevity being counterbalanced by the additional equipment necessary, and with a period longer than 10 minutes the results were not satisfactory. Why sucrose and indolebutyric acid used separately were effective but when combined did not increase rooting is not known. Treatments with lanolin paste and lanolin emulsion did not prove satisfactory. The results with toothpicks saturated with auxin solutions for branch terminals were particularly effective.

RESULTS WITH CUTTINGS FROM TREES 8 TO 90 YEARS OLD

From November through April twenty-four collections of cuttings were secured from eastern white pine trees of intermediate and adult age classes. The trees from which the cuttings were made grew in well established plantations making vigorous growth or from suppressed trees, isolated mature trees, trees trained as hedges by annual trimming, or trees transplanted during the previous two or four years. The cuttings were treated with auxins in various ways, with sucrose and solutions of nitrogenous compounds. Since the rooting responses were generally highly irregular, with no rooting occurring in many groups of cuttings, the data have been condensed by omitting the majority of the negative results in Table 3. The total number of cuttings in each experiment and test group is indicated to give the scale of the test together with the rooting percentages of all the control groups and for the treated groups in which rooting occurred.

With the exception of collections of cuttings from trees 15 years old, irregular rooting and in relatively low percentages or complete failure to root characterized these data. While low rooting was more pronounced in cuttings from trees above 15 years old, those from trees 8 to 12 years old also rooted in an irregular manner. Some rooting did occur in cuttings from trees 8, 10, 12, 15, 16, 38 and 61 years old. These responses do indicate that all ability to regenerate roots is not lost in the shoots from older trees and requires additional search for the factors responsible. A

TABLE 3.

ROOTING RESPONSES OF CUTTINGS FROM EASTERN WHITE PINE TREES 8 TO 90 YEARS OLD. DATA FOR THE CONTROL GROUPS OF CUTTINGS AND ONLY THOSE OF THE TREATED GROUPS IN WHICH ROOTING OCCURRED.

Expt. No.	Age of trees and Treatment	Total No. cuttings	No. per group	Rooted %
8 years				
32	Control	600	30	3.3
	Toothpicks saturated with I.B. soln.		30	10.0
	I.B. in lanolin paste		30	6.6
	I.B. soln., 10 mg./l. + sucrose 1.5%, 4 hrs.		30	3.3
	I.B. soln., 100 mg./l. + sucrose 1.5%, 4 hrs.		30	3.3
10 years				
37	Control	260	20	0
	Nap. in talc, 2 mg./gm.		20	5.0
	I.B. soln., 10 mg./l., pressure 10 min.		20	25.0
	I.B. in lanolin paste		20	5.0
12 years				
27	Control	180	20	5.0
	Toothpicks saturated with I.B. soln.		20	5.0
15 years				
12	Control	178	24	33.3
	I.B. in talc, 2 mg./gm.		24	20.8
29	Control	270	30	36.6
	Control, pulled off with a heel		30	40.0
	I.B. in talc, 2 mg./gm., cut with shears		30	56.6
	I.B. in talc, 2 mg./gm., pulled off with heel		30	60.0
	I.B. in lanolin paste, cut with shears		30	23.3
	I.B. in lanolin paste, pulled off with a heel		30	6.6
	I.B. in lanolin emulsion, cut with shears		30	16.6
	I.B. in lanolin emulsion, pulled off with heel		30	13.3
16 years				
13	Control	100	50	0
24	Control	380	20	0
	I.B. soln., 10 mg./l., pressure 20 min.		30	16.6
36	Control	80	20	0
	I.B. in talc, 2 mg./gm.		20	10.0
	Nap. in talc, 2 mg./gm.		20	5.0
18 years				
13	Control	460	50	0
31	Control	440	20	0
40	Control	90	30	0

TABLE 3 (continued)

Expt. No.	Age of trees and Treatment	Total No. cuttings	No. per group	Rooted %
20 years				
6	Control.....	80	20	0
	I.B. in talc, 2 mg./gm.....		20	5.0
	I.B. soln., 200 mg./l., 2 hrs.....		20	5.0
38	Control.....	180	20	0
12	Control.....	60	20	0
26 years				
27	Control.....	360	20	0
41	Control.....	100	20	0
15 to 35 years				
17	Control, a group from 1 tree.....	518	30	3.3
	I.B. in talc, 2 mg./gm., 4 groups of 4 trees.....		30	6.6
	I.B. in talc, 2 mg./gm., 4 groups of 4 trees.....		30	10.0
38 years				
13	Control.....	500	50	10.0
61 years				
10	Control.....	132	20	0
	I.B. in talc, 2 mg./gm.....		20	5.0
13	Control.....	50	50	0
27	Control.....	160	20	0
38	Control.....	100	20	0
67 years				
11	Control.....	100	20	0
25	Control.....	100	20	0
90 years				
13	Control.....	50	25	0

feature which aided understanding of irregular rooting of Norway spruce and eastern white pine cuttings in a previous study, Deuber (3), was a high degree of variability in the inherent ability of cuttings from individual trees to root. This has been termed 'clonal variation' in ability to root. Some evidence also indicates that ability to root may be associated with the vigor of growth of the parent tree or shoots from which the cutting is made, suppressed and weakly growing trees at times yielding cuttings that root more readily than those from vigorous trees.

In the present experiments the cuttings from the younger trees 8 to 12 years old were random samples from stock growing vigorously. In but one

group was the rooting response above 10 per cent. One solution treatment with indolebutyric acid did cause one group of cuttings from 10-year old trees to root 25 per cent.

With two collections from trees 15 years old and three from trees 16 years old, fairly consistent rooting occurred in one, Experiment 29. The cuttings of this experiment were from four suppressed trees 15 years old growing in an open stand of oaks. The rooting responses of the cuttings from each of the four trees were not recorded separately, but from the consistency of rooting in eight of the nine groups of cuttings it is probable that each of these trees yielded cuttings with ability to root. Of the 270 cuttings planted, 76 or 27.7 per cent rooted within 158 days. The control groups rooted 36.6 and 40 per cent respectively, and two groups treated with auxin rooted 56.6 and 60 per cent.

In the second test with cuttings of 15-year old trees, Experiment 12, the cuttings were from four moderately vigorous trees. The rooting recorded was with cuttings from but one of the four trees. Low rooting was again found with cuttings from two very vigorous trees 16 years old in Experiment 36.

The two additional collections of cuttings from 16-year old trees, Experiments 13 and 24, were random samples from a clipped hedge. Also, in Experiments 27 and 41, cuttings were obtained from another hedge composed of trees 26 years old. These hedges were long established, and close planting probably introduced serious root competition. It was desired to determine if annual pruning with consequent stimulation of new shoot formation brought about a physiological rejuvenation of these shoots with increased ability to regenerate roots. The results were definite in showing that root formation was not favorably influenced. Although a total of 940 cuttings from the two hedges were planted and given a variety of treatments with auxins, no rooting resulted. Survival of these cuttings was inferior to those from normal trees of the same age classes.

Only a limited demonstration of clonal variation in ability to root was found with cuttings secured from 38 individual trees 15 to 38 years old in Experiments 13 and 17. Ten vigorous trees 18 years old did not yield cuttings that rooted although in the previous year eight of these trees gave cuttings that rooted 5 to 20 per cent. Of ten moderately vigorous trees 38 years old, the cuttings from only one tree rooted. Professor A. J. Riker of the University of Wisconsin supplied the writer with branches of 18 trees selected for the resistance these trees were exhibiting to white pine blister rust. The trees varied in vigor and were 15 to 35 years old. Cuttings from this material received in January survived very well in the propagating bench but were very slow in starting to root. When first dug and inspected after 83 days they were treated with indolebutyric acid in talc. The first rooting of these cuttings was detected after they had been planted 188 days. One cutting had rooted from a tree 20 years old and another from a tree 34 years old. By September 26 or 260 days from planting, one to three cuttings had rooted in the groups from nine trees. The shoot

growth of eight of these trees was classed as vigorous or moderately vigorous and of one as weakly vigorous.

A 60-year old tree sampled at various times in 1940 yielded cuttings that rooted 10 to 30 per cent. In four collections from this tree in the present study but one cutting rooted, Experiment 10. Two trees 67 and 90 years old gave no cuttings that rooted.

INFLUENCE OF VARIOUS TREATMENTS UPON THE CUTTINGS OF OLDER STOCK

Numerous tests were made of the effectiveness of treatments with auxins and sucrose of the cuttings of the intermediate and adult trees together with several tests with nitrogenous compounds. The number and variety of these tests is not adequately shown in Table 3 because they were usually not effective when rooting failed to occur in the control cuttings. In other than the results of Experiment 29, with cuttings from trees 15 years old, the rooting responses were too irregular to make comparisons between the effectiveness of the auxin treatments except indications of survival, callus formation or injury.

In Experiment 29, treatment of the cuttings with indolebutyric acid in talc induced an increase in rooting above that secured in the control groups. This method was definitely superior to applying auxin in a lanolin paste or emulsion. Many instances of injury or early decay of the cutting bases were found with the paste applications and the emulsion applications were only rarely effective.

While a number of trials with auxins in aqueous solutions containing 10, 100 or 200 mg./l. of the auxin for periods of 2 to 18 hours were made as well as tests of the pressure method previously described, no consistent improvement in the rooting responses were recorded. Doran *et al.* (5) reported one unusually good result with cuttings of 30-year old white pine trees treated with a high concentration of indolebutyric acid in solution for five hours. Similar treatment of cuttings in this investigation did not prove effective. It is quite possible that considerable variation exists in the manner in which cuttings from different trees respond to auxin treatments.

Toothpicks saturated with alcoholic solutions of auxins, while effective with branch terminal shoots of young stock, rarely induced the rooting of cuttings from older trees. In a number of cases severe chemical injury to the stem tissues at the point of insertion resulted.

When the cuttings were placed in a 1.5 per cent solution of sucrose alone or in combination with indolebutyric acid, rooting was not increased. In a few instances callus formation appeared to be favored by treatment with sucrose.

Several investigators have found that treatment of cuttings with solutions of nitrogenous compounds or a nutrient solution increased rooting. Doak (4) found solutions of certain amino acids and inorganic nitrogen compounds to aid the rooting of rhododendron cuttings, and Grace (8) secured increases in the rooting of Norway spruce cuttings by supplying

a complete nutrient solution to the sand during propagation. In two experiments with eastern white pine cuttings, the cuttings were placed in 0.1 per cent solutions of ammonium sulfate, sodium nitrate or urea for 16 hours before planting. While no rooting occurred, the best survival and callus formation was found in the cuttings supplied sodium nitrate. Ammonium sulfate was slightly injurious and retarded callus formation. In Doak's experiments with rhododendron cuttings, ammonium sulfate was superior to the nitrate salt. Recently, Thimann and Poutasse (24) found root formation in leaf cuttings of *Phaseolus vulgaris* promoted especially by adenine and potassium nitrate, while ammonium sulfate had an inhibitory effect.

From the numerous tests with cuttings of eastern white pine trees of intermediate and adult ages, a method or combination of methods was not found that would consistently promote the formation of roots. Unknown internal conditions governing root formation were but rarely favorably influenced by applications of auxins, sucrose or nitrogenous compounds.

TREATMENTS WITH FUNGICIDES

Decay of dormant pine cuttings in the propagating bench is a serious problem. The writer has found no reason to subscribe to the suggestion of Snow (18) that fungi in the propagating medium may be beneficial. Cuttings from some collections are more subject to decay than others and those from older trees are the most susceptible. The latter also require three to five months or more to form roots, thereby increasing the chances for infestation. With greenwood cuttings taken during the summer and propagated in outdoor benches, the time required for root formation is longer than with dormant cuttings. Previously, Deuber (3), the use of peat or peat and sand mixtures was found to be less desirable for propagating media than sand, chiefly because of a greater prevalence of decay with peat or a peat and sand mixture than with clean sand. While the use of fresh clean sand is helpful in preventing decay of the cuttings, rotting of stem bases usually appears within the second or third month. Grace (9) encountered difficulty with decay when using sucrose and reported that treatment of the sand with ethyl mercuric bromide eliminated fungus infestation from Norway spruce cuttings. In the early part of this investigation tests were made of the effectiveness of acidifying the sand, treating the sand with ethyl mercury iodide, and disinfecting the cuttings with mercuric chloride solution or an organic sulfur dust.

When the sand was acidified with acetic acid to give a reaction of pH 4.0, there was no appreciable difference between the number of cuttings that decayed as compared with the controls in sand at pH 6.9. A preparation of ethyl mercury iodide supplied by the Research Department of the Bayer-Semesan Co. was applied to the sand a week before planting pine cuttings. Considerable chemical injury was associated with this treatment. The bark and cambium of the lower portion of the stems became discolored and many of the cuttings died within two months.

One method of disinfecting the cuttings was to stand the bases of the cuttings or to immerse the entire cuttings for five minutes in an acidified solution of mercuric chloride according to the procedure recommended by Leach *et al.* (13) for potato seed pieces. These treatments gave a preliminary protection from fungi but were not entirely free of injurious action. The most successful method tried was one in which the cutting bases were dipped in an organic sulfur dust preparation supplied by the Research Department of the Bayer-Semesan Co. Applications of the sulfur dust preparation did not interfere with previous treatments with solution or dust applications of auxins. The sulfur fungicide gave considerable protection to the cuttings over periods of three to five months and was considered especially useful when new cuttings were planted in sand in which pine cuttings had been previously grown.

THE INFLUENCE OF DORMANCY-BREAKING CHEMICALS

Although the seasonal characteristics for the optimum time to collect eastern white pine cuttings for propagation has not been determined, the general trend in work with dormant cuttings in 1939-1940, Deuber (3), indicated that rooting was more likely to occur when the cuttings were taken in January through March in the vicinity of New Haven, Conn. Norway spruce shoots, on the other hand, reached an optimal state for collection in December. To see if activity of the buds of eastern white pine and Norway spruce shoots could be stimulated and root formation influenced, a few tests were conducted in November and December with the dormancy-breaking chemicals ethylene chlorhydrin and thiourea.

Vapor treatments with ethylene chlorhydrin consisted in placing the cuttings in sealed flasks containing one drop of the chemical per liter for 2, 4 and 25 hours. Norway spruce cuttings were severely injured in all three of the time periods. The pine cuttings did not show early visible signs of injury but within 38 days most of them died without bud development or rooting being influenced. Pine cuttings subjected to a similar concentration of the vapors of ethylene chlorhydrin for periods of 10, 20, 40 and 60 minutes survived for over two months, but neither bud opening nor rooting occurred. Standing the bases of pine and spruce cuttings or immersing the entire cuttings in 2 per cent solutions of thiourea for 1 to 3 hours reduced the survival of the cuttings of both species and did not positively influence bud development or root formation. The preliminary results with these treatments did not warrant additional tests.

THE ROOTING RESPONSES OF OTHER SPECIES OF FIVE-NEEDED PINES

The relative resistance of various species of five-needled pines to white pine blister rust caused by *Cronartium ribicola* has been under observation for many years. Among the American forest pathologists who have studied this problem are Spaulding (19, 20, 21), Lachmund and Hansbrough (12), and Hirt (10). Since the root regeneration characteristics of all but *Pinus Strobus* appear to be practically unknown, the writer took the opportunity

to test the rooting of the shoots of seven species of *Pinus* growing in the Arnold Arboretum. The species tested were: *Pinus monticola*, *P. parviflora*, *P. koraiensis*, *P. peuce*, *P. Cembra* and *P. Lambertiana*. In addition, a collection of branches from ten trees of *P. Lambertiana* was kindly supplied by Mr. James L. Mielke, U. S. Department of Agriculture, Division of Forest Pathology, from San Francisco, Calif.

Since the number of trees of a given species in the Arnold Arboretum was limited, cuttings were taken from individual trees, and in all but *P. Cembra* they were mature, ranging in age from 32 to 69 years old. Trees of *P. Cembra* 12 and 23 years old were available. The trees from which the California collection of *P. Lambertiana* were secured ranged between 12 and 25 years in age. The data of these tests are recorded in Table 4.

TABLE 4.
ROOTING RESPONSES OF THE CUTTINGS OF SEVEN SPECIES OF FIVE NEEDLED PINES.

Species	Age in years	Total No. cuttings	No. per group	Rooted
				%
<i>P. monticola</i>	56	196	18	5.5
<i>P. monticola</i>	45	120	20	0
<i>P. parviflora</i>	69	80	20	0
<i>P. flexilis</i>	56	80	20	0
<i>P. koraiensis</i>	36	60	15	0
<i>P. peuce</i>	32	220	20	0
<i>P. Cembra</i>	23	200	25	0
<i>P. Cembra</i> *.....	12	60	30	30.0
<i>P. Cembra</i> **.....	12	60	30	10.0
<i>P. Lambertiana</i>	57	40	20	0
<i>P. Lambertiana</i>	12 to 25	660	30	0

*Cuttings made from shade shoots. **Cuttings made from sun shoots.

Exceedingly limited rooting of the cuttings of these trees was found. This may be attributed to the age of the parent trees or to other unknown circumstances which may also apply to the difficulty in rooting found with the older age classes of eastern white pine. Some of the exotic pine trees were in a vigorous condition, while others were not. The *P. monticola* tree from which one cutting rooted was vigorous and its cuttings survived in large numbers during the first 90 days in the propagating bench. The cuttings from trees of *P. koraiensis*, *P. flexilis* and *P. parviflora* decayed and died in large numbers. The rooting responses of 30 per cent with shade shoots and 10 per cent with sun shoots of a 12-year old tree of *P. Cembra* is of interest because of the recognized resistance of this species to white pine blister rust, Spaulding (21) and Hirt (10).

The large collection of cuttings of *P. Lambertiana* trees from their

natural range in California survived very well for over six months. Callus development was stimulated by several treatments with auxins but no rooting occurred. After six months, chlorosis of the needles became general and many cuttings died. The cuttings of one collection of this species from a tree in the Arnold Arboretum behaved in a similar manner to those collected in California. This preliminary survey of the rooting characteristics of seven species of five-needled pines growing in the Arnold Arboretum and one from its native range indicates that similar problems in root regeneration apply to these species as found with those of eastern white pine trees. The cuttings root with great difficulty.

DISCUSSION

The general results of this investigation indicate that the vegetative propagation of five-needled pines has some very definite limitations. Somewhat over 10,000 dormant cuttings were placed under conditions favorable for root regeneration, but consistent rooting, with a few exceptions, occurred only with cuttings from young trees, 2 to 6 years old. Occasional rooting in relatively low percentages characterized the cuttings secured from trees 7 years old and older. Even cuttings from juvenile stock of these pines do not root as promptly nor as abundantly as cuttings from species that root easily. Unknown features of the shoots or parent trees from which they are obtained make the regeneration of roots an exceedingly uncertain process.

Considerable evidence indicates that standard methods of applying root-inducing chemicals in the form of dusts or solutions are especially effective with cuttings from young trees. These treatments were most effective when the control cuttings were able to root to some extent. The treatments hasten the formation of roots and increase the number of cuttings that root. Hastening root formation is highly significant, for the survival of unrooted cuttings is constantly threatened by drying out and by decay. Delisle (2) described some of the histological and anatomical changes induced by auxin treatment of eastern white pine cuttings but concluded that differences in rooting ability between cuttings of young and old trees appeared to be largely of a physiological nature.

Occasionally applications of auxins increased the rooting of cuttings from older trees, but the action was not consistent. The best responses were obtained when the control cuttings possessed some ability to root. A retreatment of cuttings with indolebutyric acid in talc after they had been in the bench two or three months was a favorable practice in several experiments. Supplying sucrose to the cuttings was favorable at times but not consistently so. Placing the cuttings in solutions of nitrogenous compounds did not increase the rooting.

There were some indications, but not conclusive ones, that moderately suppressed trees yield cuttings that root more readily than those from highly vigorous trees. Shade shoots of one *Pinus Cembra* tree rooted much better than sun shoots. These observations appear to be in order with the

well established facts that lateral shoots root more readily than terminal and that shoots from lower branches root better than those from near the top of the crown.

Some evidence supports the view that ability to root varies markedly from tree to tree. But the data are not so conclusive as those obtained by Snow (16) with red maple cuttings or for Norway spruce by Deuber (3). In the few instances in which collections of cuttings were made from the same pine trees for two seasons, the rooting responses of the second year's collections were much less than the first. It is therefore not possible to state that adult eastern white pine trees which yield cuttings that root one season will continue to yield cuttings that will root in succeeding years.

From studies of the rooting characteristics of many five-needled pine cuttings over a period of three years, the suggestion is put forth that some factor in the nature of an inhibitor will be found to account for the difficulties experienced in root regeneration. It was found by Jacobs (11) that cuttings from trees of *Pinus radiata* up to 6 years old were the most dependable for propagation purposes. Cuttings with terminal buds containing male cone primordia always failed to root and most of the vigorous shoots of trees 7 to 8 years of age possessed male cones. It was reported by Deuber (3) that shoots of *P. densiflora* from branches bearing young ovulate cones rooted much more abundantly than those from branches without ovulate cones. In the present study, a marked transition appeared to occur in ability to root between eastern white pine cuttings from trees up to 6 years old and those 7 years old or older. The cuttings from 7-year old trees responded to auxin treatment much like cuttings from younger trees. With the exception of a few trees 15 years old, the cuttings from older trees did not respond to any appreciable extent to auxin applications. It is quite possible that such facts as the greater ability of lateral shoots to root than terminal or branch terminals, those from the basal branches of the crown than those from the apical branches, and the more frequent rooting of cuttings from somewhat suppressed trees than very vigorous trees will be explained on the basis of a physiological inhibitor.

In view of the uncertainties with root regeneration with cuttings of older five-needled pine trees, vegetative propagation may for the time be confined to young stock. Nursery or field stock 4 to 6 years old yields sufficient numbers of cuttings to multiply superior types of trees. Stock in these age classes can be tested for resistance to diseases common to juvenile and adult trees as is being done by Hirt (10). Valuable progeny of tree breeding experiments may be increased by vegetative propagation of young stock.

SUMMARY

The rooting of numerous collections of dormant stem cuttings of *Pinus Strobis* were tested as well as those of lesser numbers of cuttings of *P. monticola*, *P. parviflora*, *P. flexilis*, *P. koraiensis*, *P. peuce*, *P. Cembra* and *P. Lambertiana*.

Cuttings from eastern white pine trees 2 to 6 years old possessed considerable natural ability to root.

With the exception of a few trees 15 years old, cuttings from trees 8 to 90 years old rooted only occasionally and in relatively low percentages or not at all.

Treatment of the cuttings of young stock with indolebutyric acid or α -naphthaleneacetic acid in talc dusts or in aqueous solutions was effective in hastening and increasing the rooting responses.

Similar treatments with cuttings from older trees were somewhat effective in a few collections but not consistently so.

Indolebutyric acid supplied in lanolin paste or in lanolin emulsion was generally unsatisfactory. In many cases injury to the stem bases occurred with the paste applications.

Ends of toothpicks saturated with alcoholic solutions of indolebutyric acid or α -naphthaleneacetic acid inserted in the bases of cuttings made from branch terminal shoots of 6-year old trees were effective in inducing root formation. Similar treatment of cuttings from lateral shoots of older trees generally produced chemical injury.

Supplying sucrose to the cuttings with or without auxin did not appreciably influence root formation.

Placing the cuttings in solutions of ammonium sulfate, sodium nitrate or urea, preliminary to planting, did not increase the formation of roots. Sodium nitrate was favorable to callus development while ammonium sulfate was slightly injurious.

Cuttings secured from eastern white pine hedges pruned annually did not root as satisfactorily as those from normal trees of the same age.

Some evidence of clonal variation in rooting ability was found among various collections of cuttings from individual trees.

Dipping the bases of cuttings in an organic sulfur fungicide gave the most satisfactory protection against decay.

The dormancy-breaking chemicals ethylene chlorhydrin and thiourea were not effective in forcing the development of buds or roots.

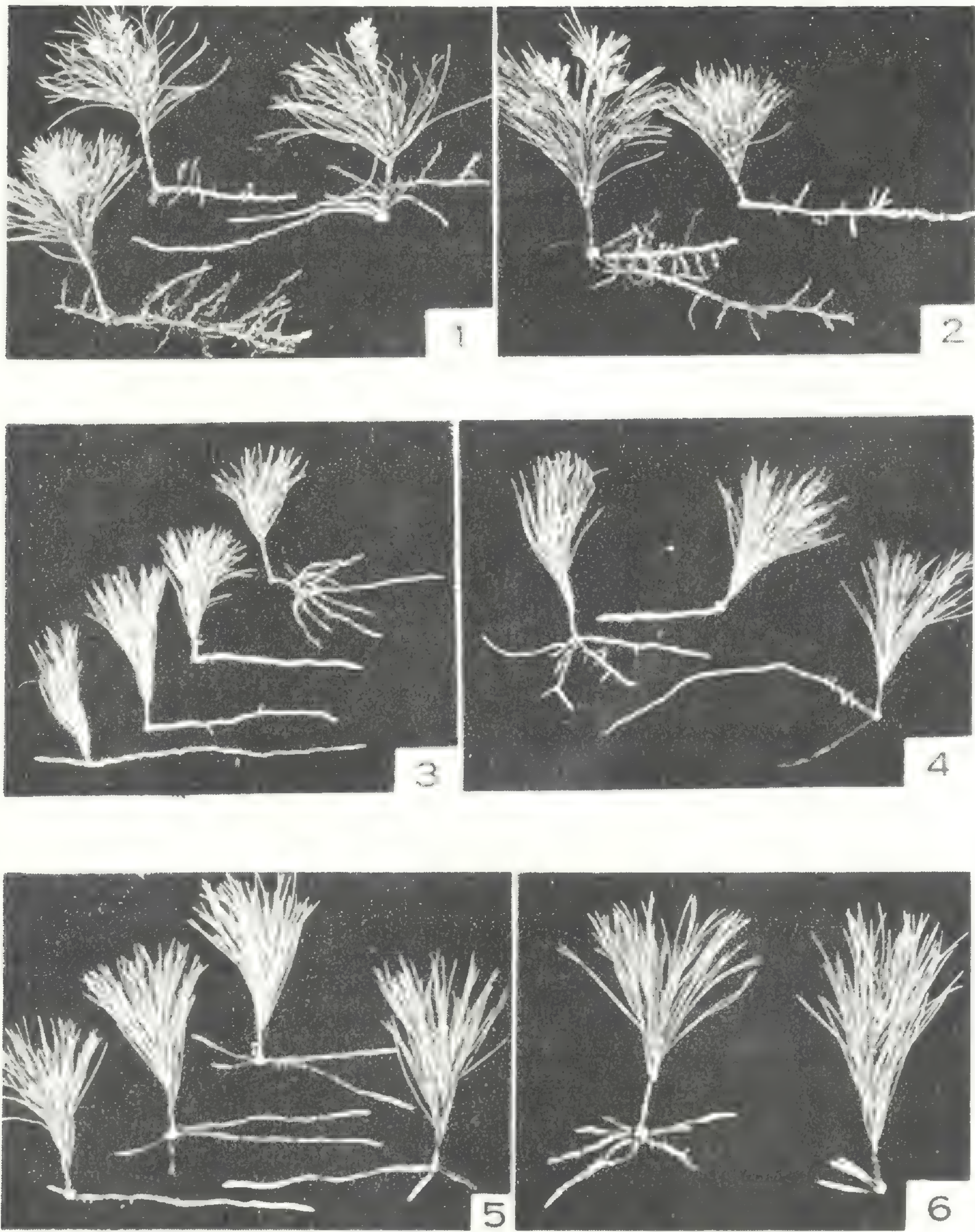
Cuttings from adult trees of *Pinus parviflora*, *P. flexilis*, *P. koraiensis*, *P. peuce*, *P. Cembra* and *P. Lambertiana* did not root.

Low rooting occurred in one collection of cuttings from one tree of *P. monticola*.

The shade shoots of a *P. Cembra* tree 12 years old rooted considerably better than sun shoots.

LITERATURE CITED

1. BUTTERFIELD, N. W. and J. A. McCLINTOCK (1939). New method of treating cuttings. *Proc. Amer. Soc. Hort. Sci.* **37**: 1077-1079.
2. DELISLE, A. L. (1940). Histological and anatomical changes induced by indole-acetic acid in rooting cuttings of *Pinus Strobus*. *Amer. Jour. Bot.* **27**: (10): 3s.
3. DEUBER, C. G. (1940). Vegetative propagation of conifers. *Trans. Connecticut Acad. Arts & Sci.* **34**: 1-83.
4. DOAK, B. W. (1940). The effect of various nitrogenous compounds on the rooting of *Rhododendron* cuttings treated with α -naphthaleneacetic acid. *New Zealand Jour. Sci. & Tech.* **21**: 336A-343A.
5. DORAN, W. L., R. P. HOLDSWORTH and A. D. RHODES (1940). Propagation of white pine by cuttings. *Jour. Forest.* **38**: 817.
6. FARRAR, J. L. and N. H. GRACE (1940). Note on the propagation by cuttings of white pine and white spruce. *Canadian Jour. Res.* **18**: 612.
7. GARDNER, F. E. (1929). The relationship between tree age and the rooting of cuttings. *Proc. Amer. Soc. Hort. Sci.* **26**: 101-104.
8. GRACE, N. H. (1939). Vegetative propagation of conifers. II. Effects of nutrient solution and phytohormone dusts on the rooting of Norway spruce cuttings. *Canadian Jour. Res.* **17**: 312-316.
9. ——— (1940). Vegetative propagation of conifers. IV. Effects of cane sugar, ethyl mercuric phosphate and indolylacetic acid in talc dust on the rooting of Norway spruce. *Canadian Jour. Res.* **18**: 13-17.
10. HIRT, R. R. (1940). Relative susceptibility to *Cronartium ribicola* of 5-needled pines planted in the east. *Jour. Forest.* **38**: 932-937.
11. JACOBS, M. R. (1939). The vegetative reproduction of forest trees. I. Experiments with cuttings of *P. radiata* Don. *Commonwealth Forest. Bur. (Canberra) Bull. No. 25*, pp. 1-28.
12. LACHMUND, H. G. and J. R. HANSBROUGH (1932). Preliminary report on the relative susceptibility of sugar pine and western white pine to blister rust. *Jour. Forest.* **30**: 687-691.
13. LEACH, J. G., H. W. JOHNSON and H. E. PARSON (1929). The use of acidulated mercuric chloride in disinfecting potato tubers for the control of *Rhizoctonia*. *Phytopath.* **19**: 713-724.
14. MIROV, N. T. (1938). Vegetative propagation of white pine as a possible method of blister rust control. *Jour. Forest.* **36**: 807-808.
15. ROMBERG, L. D. and C. L. SMITH (1938). Effects of indole-3-butyric acid in the rooting of transplanted pecan trees. *Proc. Amer. Soc. Hort. Sci.* **36**: 161-170.
16. SNOW, A. G., JR. (1939). Clonal variation in rooting response of red maple cuttings. *Northeastern Forest Expt. Sta. Tech. Note No. 29*.
17. ——— (1940). Rooting white pine cuttings. *Northeastern Forest Expt. Sta. Occasional Paper No. 11*, pp. 1-6.
18. ——— (1941). White pine propagation. *Jour. Forest.* **39**: 332-333.
19. SPAULDING, PERLEY (1922). Investigations of the white pine blister rust. *U. S. Dept. Agriculture Bull.* 957.
20. ——— (1925). A partial explanation of the relative susceptibility of the more important American white pines to the white pine blister rust. *Phytopath.* **15**: 591-597.
21. ——— (1929). White pine blister rust: a comparison of European with North American conditions. *U. S. Dept. Agriculture Tech. Bull.* 87.
22. STOUTEMEYER, V. T. (1937). Regeneration in various types of apple wood. *Iowa Agr. Expt. Sta. Bull.* 220.
23. THIMANN, K. V. and A. L. DELISLE (1939). The vegetative propagation of difficult plants. *Jour. Arnold Arb.* **20**: 116-136.
24. THIMANN, K. V. and E. F. POUTASSE (1941). Factors affecting root formation of *Phaseolus vulgaris*. *Plant Physiol.* **16**: 585-598.
25. WARMKE, H. E. and A. F. BLAKESLEE (1939). Induction of simple and multiple polyploidy in *Nicotiana* by colchicine treatment. *Jour. Hered.* **30**: 419-432.



DEUBER, VEGETATIVE PROPAGATION OF EASTERN WHITE PINE

EXPLANATION OF PLATE

Pinus Strobus cuttings from trees 2 to 7 years old. Planted in January and photographed after 134 days in the propagation bench.

- Fig. 1. Cuttings made from terminal shoots of trees 2 years old. No chemical treatment.
- Fig. 2. Cuttings from trees 3 years old, the one on the left from a terminal shoot, the one on the right from a lateral shoot. No chemical treatment. In these and the cuttings in Fig. 1 lateral root development was much more advanced than in cuttings from older trees.
- Fig. 3. Cuttings from trees 4 years old made from lateral shoots. No chemical treatment.
- Fig. 4. Cuttings from trees 5 years old made from lateral shoots. Treated with indolebutyric acid in talc.
- Fig. 5. Cuttings from trees 6 years old made from lateral shoots. Treated with indolebutyric acid in talc.
- Fig. 6. Cuttings from trees 7 years old made from lateral shoots. Treated with indolebutyric acid in talc.

OSBORN BOTANICAL LABORATORY
YALE UNIVERSITY
NEW HAVEN, CONN.

A STUDY OF MANIHOT IN NORTH AMERICA

LEON CROIZAT

With one text-figure

THIS paper aims at presenting a preliminary account of the North American species of *Manihot* Mill. which have been confused in herbarium and in the literature as *M. carthagenensis* Jacq. The species so confused exceed ten in number, and the uncertainty as to their limits and distribution is now so great that all classification outside of the limits of a critical work has become impossible.

The difficulties in the path of a taxonomic treatment of *Manihot* are notorious. The foliage of the genus is polymorphous, the flower seldom very revealing, and the material available even in the best herbaria often incomplete or misleading, because seeds of different species often become mixed at mounting. In addition, the progress of speciation among forms of the same group is comparatively weak, so that related species are connected by intergrades which can be placed with much difficulty or not at all when field-notes are lacking. I have been fortunate in having loans of much needed specimens from the Curators of the U. S. National Herbarium, the University of California, the New York Botanical Garden, the University of Arizona, and the Gray Herbarium of Harvard University. These specimens are cited, respectively, under the abbreviations US, UC, NY, UA, and GH, the additional reference AA connotating specimens in the herbarium of the Arnold Arboretum of Harvard University.

Several of the specimens loaned from the U. S. National Herbarium bears manuscript names which have been neglected by their own and all subsequent authors. These names are of indifferent value, some having been superseded, others being doubtfully good. To simplify the citations, which in a work of this nature should be reduced as far as possible, I have consistently disregarded these *nomina nuda*.

In view of the generally accepted belief that *Manihot* as well as *Jatropha*, including *Cnidoscolus*, have flowers with a calyx but no corolla, it seems pertinent to emphasize the fact that so early an author as Pohl (Pl. Bras. Ic. Descr. 1: 17, 56. 1827) correctly interpreted the perianth of these genera, stating that these structures have *a corolla but no calyx*. Authors like Pax & Hoffmann (Pflanzenr. 44 (iv. 147. ii): 22. 1910; Engl. & Prantl, Nat. Pflanzenf. ed. 2. 19(c): 164, 174. 1931), who hold to the opinion that *Manihot* and *Jatropha* (with *Cnidoscolus*) have a calyx but no corolla, cannot appraise the significance of the relics of the calyx which appear in certain species of this alliance, and are thus liable to misunderstand the morphology and phylogeny of the Euphorbiaceae Jatrophaceae and Manihoteae.

The very nature of the plants under study and the difficulty of securing fully comparable specimens, even from large collections, make it impossible to prepare a truly workable key. The reader is referred to Fig. 1, in which typic outlines of leaf-lobes are illustrated and the species are grouped according to their foliar habit.

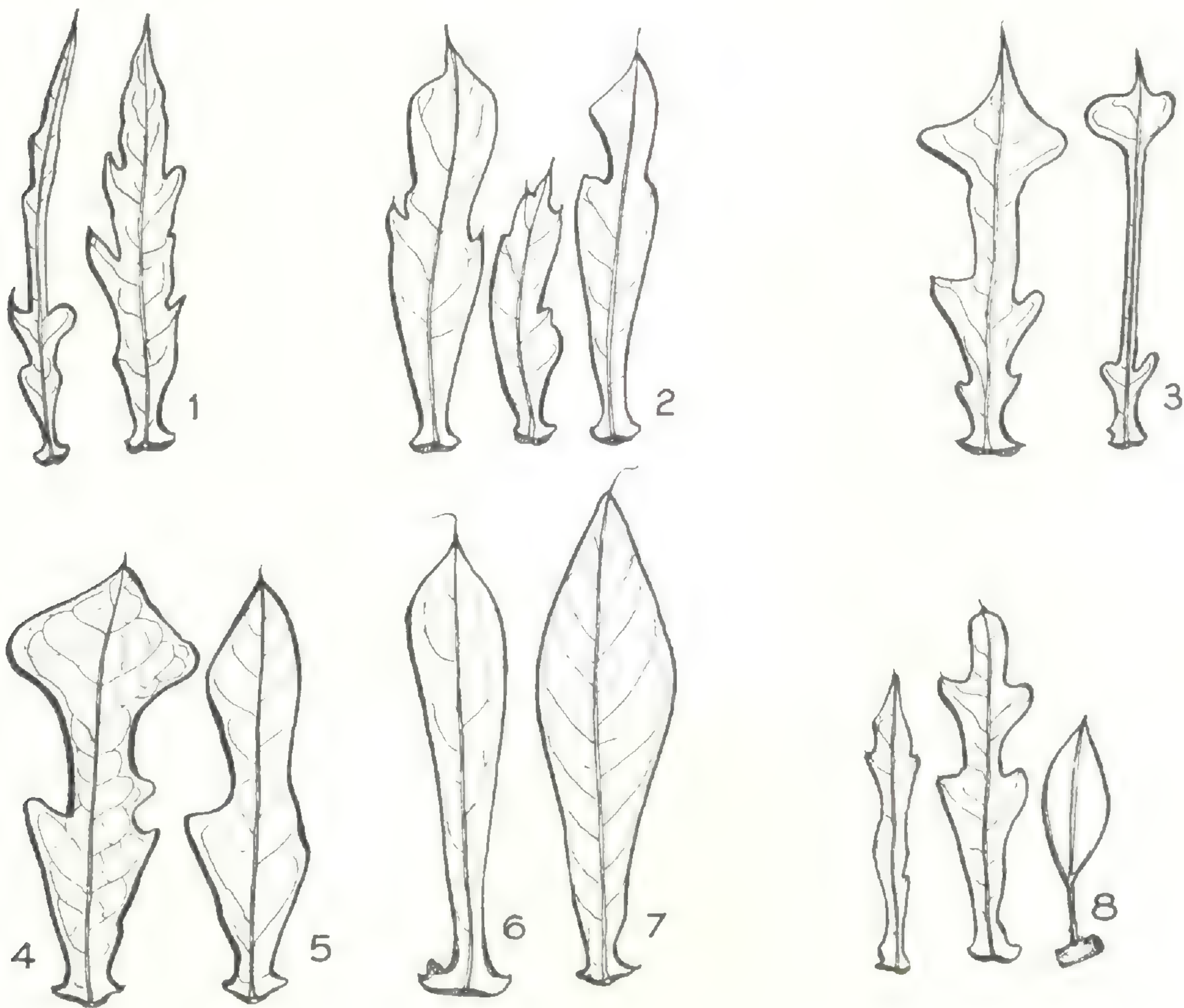


Figure 1

Typical leaf-lobes of *Manihot* spp.; 1. as occurring in *M. angustiloba* Muell.-Arg. (Arizona, Sonora, Chihuahua), *M. mexicana* Johnst. (Sinaloa, Jalisco, Aguascalientes, Guanajuato, Queretaro, Mexico, Morelos), and *M. parvicocca* Croiz. (Chiapas, Nicaragua, San Salvador); 2. of *M. chlorosticta* Standley & Goldm. (Baja California, Sinaloa); 3. of *M. Davisiae* Croiz. (Arizona); 4. of *M. intermedia* Weath. (Guerrero); 5. of *M. colimensis* Croiz. (Colima); 6. of *M. rubricaulis* Johnst. (Durango, Sinaloa) and *M. isoloba* Standley (Sonora, Chihuahua); 7. of *M. aesculifolia* Pohl (Honduras, Vera Cruz, Guerrero); 8. of *M. ludibundus* Croiz. (Nicaragua).

Manihot carthagenensis (Jacq.) Muell. Arg. in DC. Prodr. **15**(2): 1073. 1866; Pax & Hoffmann, Pflanzenr. 44 (iv. **147**. ii): 81. 1910.

Janipha carthagenensis Jacq. Select. Stirp. Amer. Hist. 256, Pl. 162, Fig. 1. 1763.

Pax & Hoffmann have little understanding of the distribution of this species, and *Palmer 1027a*, which they cite under it, is *M. colimensis* Croiz., a species that bears to *M. carthagenensis* but superficial resemblance. It is altogether probable that authors who report *M. carthagenensis* north of

Costa Rica are in error, and this species is *certainly* to be excluded from the flora of the United States.

The classic locality is "Passim Carthagenae," and I have so far seen but one specimen which I can safely bring under Jacquin's binomial, *Elias 1546*: Colombia, El Palmar, region of Barranquilla, 1937 (AA), distributed as *M. dulcis* var. *diffusa*. In this specimen are found the costulate lobes and perianth of the ♂ flower illustrated by Jacquin and the disc with a deep lobulation (the sinuses being fully to 2 mm. deep) which prompted Jacquin to describe a disc with stamens "E receptaculo inter nectararii radios adscedentia." The range of *M. carthagenensis* remains to be defined, as the plant of eastern Venezuela may not be this species.

Manihot gualanensis Blake, Contr. U. S. Nat. Herb. **24**: 13. 1922.

A photograph of the holotype (*Blake 7688*, US) is available here. It is unfortunate that all the available material lacks fruits, and that it proves impossible to decide whether Blake's species is in some measure conspecific with *M. aesculifolia* H.B.K. For the present, I identify as *M. gualanensis* the following two collections: *Maxon, Harvey & Valentine 7192*: Nicaragua, Ameya, Dept. Chinandega, 1923 (NY), originally distributed as *M. aesculifolia*, and *Gentle 2539*: British Honduras, Cayo District, Vaca, 1938 (AA), identified in herbaria as *M. carthagenensis*. The leaves are comparatively large and full for a species of this group.

Manihot aesculifolia (H. B. K.) Pohl, Pl. Bras. Ic. Descr. **1**: 55. 1827; Muell.-Arg. in DC. Prodr. **15**(2): 1065. 1866; Pax & Hoffmann, Pflanzenr. 44 (iv. **147**. ii): 58. 1910; Standley, Contr. U. S. Nat. Herb. **23**: 645. 1923.

Janipha aesculifolia H. B. K. Nov. Gen. & Sp. **2**: 107. Pl. 109. 1817.

The classic locality is "In litore sinus Champecensis." *Bangham 300*: Honduras, San Pedro Sula, 1939 (AA) is a perfect match of Kunth's plate. The leaf with 7 lobes and with the outer 2 lobes definitely reflexed, illustrated in the Nova Genera and exhibited by the *Bangham* collection, is not common in this species. In most cases the outline of the leaf is rounded toward the base on account of the failure of the two lowest lobes to develop. The median lobes are seldom pandurate, and if so, not deeply. In addition to the *Bangham* sheet already cited, I identify under this species: *Purpus 8448*, Vera Cruz, Barranca de Panoya, 1919 (UC, NY); *Hinton 6486*, Guerrero, Coyuca, "on cliffs, 1.5 m. high," 1934 (NY). The inflorescence is borne apically, and is subspicate to racemose, up to about 20 cm. long, the capsule when nearly ripe is globose, the columella about 8 mm. long, and the seed, not quite ripe, about 9 mm. long and 7 mm. broad.

The range of Honduras, Vera Cruz, and Guerrero is peculiar. Usually, the Euphorbiaceae of the east coast of Mexico are much more widely distributed than those of the west coast, and are seldom found to cross over from the coast of the Atlantic to that of the Pacific. *Hinton 6486* cannot at present be classified otherwise than as *M. aesculifolia*, but a critical study of the distribution of this species should be undertaken as soon as possible.

Manihot rhomboidea Muell.-Arg. *Linnaea* **24**: 205. 1865; in DC. *Prodr.* **15**(2): 1064. 1866; Pax & Hoffmann, *Pflanzenr.* 44 (iv. **147**. ii): 55. 1910; Millspaugh, *Field Mus. Publ. Bot.* **1**: 375. 1898; Standley, *Contr. U. S. Nat. Herb.* **23**: 645. 1923.

Millspaugh cites *Schott 518* twice, under both *M. carthagenensis* and *M. rhomboidea*, noticing under the last that Schott spells the local name *Xcaxe*. *Schott 518* (US) is certainly conspecific with *Gaumer 1142* (AA, NY), and very likely the same as *Purpus 6112*: Baños del Carrizal, Vera Cruz, 1912 (UC). That one species is involved here seems well established, and Millspaugh errs in identifying it as *M. carthagenensis*, for the *Schott* material has in the ♂ flower a somewhat inflated and subentire disc, which does not agree in the slightest with the peculiarly lobate disc of Jacquin's Colombian plant. The type of *M. rhomboidea* cannot be seen, and I accept the collections cited under this binomial from description, finding in the material at hand characteristically minute basal lobes, which agree with Mueller's note: "Lobi infimi foliorum reliquis multo breviores."

Manihot ludibunda sp. nov.

Fruticulus videtur totus glaberrimus, caulibus novellis herbaceis gracilibus, vetustioribus ligneis crassitie pennae anserinae. Foliis ludentibus, ambitu totis nec ultra 5-6 cm. magnis, raro 1-3-lobatis, plerumque 5-lobatis; lobis 2-4 cm. longis, spatulato-oblongis vel (basalibus) oblanceolatis, mediis saepissime constricto-panduratis, apice dilatato-quadrangulatis, breviter acuminatis subsetulosis, laminae parte integra vix 2-3 mm. magna, inde lobis fere ad petioli radicem liberis; petiolo gracili, 1.5-5 cm. longo, stipulis minimis vel nullis. Inflorescentia gracili, apicali vel laterali, 3-5 cm. longa. Flore ♂: pedicello gracillimo 7-10 mm. longo, stipulis persistentibus nullis; perianthio ca. 10 mm. longo, lobis ovato-acuminatis vix 3-3.5 mm. longis, totidem latis, disco cum pistillodio, margine (videtur) profundius 2-lobulato ca. 2 mm. magno, staminibus (videtur) 10 in serie duplici, longioribus ad 8, brevioribus ad 5-6 mm. longis, filamentis gracillimis. Flore ♀: (vix maturo) lobis 5, liberis, lanceolato-ellipticis, ca. 4 mm. longis, 1.5 mm. latis, ovario costulato 2 mm. longo, 1.75 mm. lato, disco carnosio 2 mm. lato, 1 mm. longo, stylis carnosius more generis ramosis.

GUATEMALA, Dept. Huehuetenango, Uaxackanal, 1300-1400 m., C. & E. Seler 2814, July 1896 (NY, TYPE).

I know of no other species to which this plant can be assimilated. The lone simple leaf that appears on the type-specimen may be occasional, but it is worthy of notice as an indication of the tendency of *M. ludibunda* to have less than 5 lobes in each leaf. The ♂ perianth and the foliage agree neither with *M. parvicocca* nor with *M. rhomboidea*. The type was originally distributed as *M. carthagenensis*.

I treat *Manihot* as a name of the feminine gender to conform with Crantz's early usage of the genus (*Inst.* **1**: 167. 1766). Neither Miller (*Gard. Dict.*, Abridg. edit., 1754) nor Adanson (*Fam. Pl.* **2**: 356. 1763) lists binomials.

Manihot parvicocca sp. nov.

Fruticulus videtur, totus glaberrimus. Foliis profundissime lobatis, habitu primo intuitu dissectis, illis *M. angustilobae* simillimis; limbo

toto ad 16 cm. transverse magno, lobis 5–7, infimis 2 interdum minimis, quove sublineari longissime acutato, 10–20 vices longiore quam lato, majoribus ca. 10 cm. longis, 4–5 mm. latis, lobulis 1–2 saepissime incurvis auctis, minoribus linearibus vix ultra 2–3 cm. longis, elobulatis vel tantum leviter repandulis, petiolo ad 5–6 cm. longo. Inflorescentia terminali gracili ad 10 cm. longa. Perianthio ♂ campanulato ca. 10 mm. longo, 5–6 mm. lato, lobis ovato-triangularibus ca. 3 mm. longis totidemque latis, disco plus minusve lobulato (videtur) ad 3 mm. magno, staminibus in serie (videtur) duplici 7–9, 5–6 mm. longis. Perianthio ♀ ignoto; fructu capsulari globoso vix 8–10 mm. magno, epicarpio fungoso more generis secedibili, coccis delapsis 8–9 mm. longis, columella 3–4 mm. longa, semine scaraboeo applanato, 5–6 mm. longo, 4.5 mm. lato, caruncula valida flabellata, erecta, 3 mm. lata, 1.5 mm. longa, arillo in semine maturo ochraceo vel cinereo, maculis longitudinalibus olivaceis paucioribus insignito.

Mexico, Chiapas, Siltepec (south of the town of Chicomuselo, near the Guatemalan boundary), *Matuda* 1665, Aug. 1937 (TYPE, AA); Chiapas, near Montserrat, "on rocky mountains," *Purpus* 10213 (NY, UC); Chiapas, Hacienda Montserrate, *Purpus* 9233 (UC); Chiapas, top of ridge back of Tonalá, alt. 1200–2500 ft., *Nelson* 2899 (GH).

Probably here belong two other specimens from Central America, *Pittier* 132, Guatemala, Baja Verapaz, Cuesta de Cachil, alt. 1200–1600 m., 1905 (NY); *Calderón* 1023, San Salvador, Cerro de la Olla, 1922 (NY). The extension of the range of a Chiapas species to Guatemala, Dept. Baja Verapaz, is to be expected and I find nothing in the poor *Calderón* collection at hand which is incompatible with the characters of typical Chiapas material. *Manihot parvicocca* would seem to be the southern counterpart of *M. mexicana* Johnst., of which it has the small capsule. *Manihot mexicana*, however, has a much larger ♂ flower and leaves that are on the whole more lobulate-repand. The columella of *M. parvicocca* is remarkable for its shortness and bluntness, that of *M. mexicana* being about twice as long (up to 7 mm.) and not very blunt. The *Nelson* collection is cited with doubt by Johnston in the publication of *M. mexicana*.

Manihot mexicana Johnst. Contr. Gray Herb. 68: 90. 1923.

This proves to be a very important species, with affinities that are certainly not in the direction of *M. rubricaulis* Johnst. By its range and characters, *M. mexicana* connects *M. angustiloba* Muell.-Arg. (Arizona, Sonora, Chihuahua) with *M. parvicocca* Croiz. (Chiapas, Guatemala, San Salvador), the distribution of the complex thus involved being one of the largest.

To the numerous specimens cited by Johnston in the original publication the following may be added: *Palmer* 222, Sinaloa, Topolobampo, 1897 (US); *Rose* 1608, Sinaloa, between Rosario and Colomas, 1897 (US); *Rose & Rose* 11190, Queretaro, near Queretaro, 1906 (NY); *Rose & Hay* 6201, Aguascalientes, near Aguascalientes, 1901 (US); *Lyonnet* 301, Morelos, Cuernavaca, 1929 (NY); *Hinton* 6188, Mexico, Temascaltepec, 1934 (NY). None of these specimens is in fruit, so that the determinations are tentative. The extension of the range of *M. mexicana* to Sinaloa seems to be authenticated by *Rose* 1608, which quite agrees with typical material of the species. *Palmer* 222, on the contrary, is very close to the Guaymas

plant (*Palmer 233*), which the seed shows to belong to *M. angustiloba*. The plants from Aguascalientes and Queretaro may actually represent a strong variety. On the basis of the available material, *M. mexicana* would seem to occur in Jalisco (loc. class.: hillsides of Zapotlan), Sinaloa, Aguascalientes, Guanajuato, Queretaro, Morelos, Mexico. It is not impossible that the holotype of *M. mexicana* will prove to be a form on the outskirts of the biological limits of the species.

Gregg 198, from an unknown locality but collected in 1848 or 1849, cited by Johnston in the publication of *M. mexicana*, is probably the same as the plant of Queretaro, Aguascalientes and Morelos, and there are good historical and botanical reasons to believe that it was also collected in this general region. Its ♂ flowers are small, apparently not as large as those of the plant of Jalisco.

Manihot intermedia Weatherby, Proc. Am. Acad. **45**: 427. 1910, (Contr. Gray Herb. **2**: 427. 1910); Pax & Hoffmann, Pflanzenr. 44 (iv. **147**. ii): 101. 1910; Standley, Contr. U. S. Nat. Herb. **23**: 643. 1923.

A very distinct species, so far as known localized in Guerrero, Mexico. The larger lobes of the leaf are usually deeply pandurated, very glaucous, and pale green. The flowers in the holotype, *Pringle 13938* (loc. class., cañon near Iguala) are subtended by bristly persistent bracteoles and the perianth is deeply colored. The seed is scaraboid, that is, depressed in back and front, with sharp lateral keels, 10 mm. long, 8 mm. broad; the caruncle is very large, about 6 mm. broad and 2 mm. long, fan-shaped. Here belong: *Rusby 2*, Limon Mt. alt. 4000 ft., 1910 (NY); *Mexia 8778*, Sierra Madre del Sur, north of Río Balsas, Distrito Adama, "streamside, suffrutescent, 3.5 m. high, many stemmed," 1937 (NY). The seed on this specimen is brightly colored, shiny, with many fine dorsal mottlings from side to side.

Manihot colimensis sp. nov.

Frutex videtur glaberrimus. Foliis pro more 5-lobatis, totis ad 11 cm. longis, 12-15 cm. latis, lobis fere ad petioli radicem partitis, saepissime oblongo-panduratis apice abrupte dilatatis, ad 11 cm. longis, 1-2.5 cm. latis, subtus plus minusve glaucis in sicco membranaceis fragillimis; petiolo gracili 4.5-7 cm. longo, stipulis nullis. Inflorescentiis apicalibus ad 10 cm. longis, bracteolis deciduis. Floribus ♂: perianthio 9-11 mm. longo, ca. 7 mm. lato, in lobis 5 ad 9 mm. longis partito, lobis ovato-triangularibus margine carosis, disco in lobis 5, quove ad apicem retuso (inde disco duplicatolobato) partito, ca. 4-5 mm. lato, staminibus 10 in serie duplici, 7-8, 10-11 mm. longis. Floribus ♀: perianthio ad basim partito, lobis 5 lanceolatis, ad 10 mm. longis, 2.5-3 mm. latis, ovario glabro ca. 2.5 mm. longo, 2 mm. lato, in sicco costulato, stylis multipartitis, disco in ovarii epicarpium more generis confluyente ad 3 mm. lato, 1 mm. longo. Capsula matura pedicello ultra 3 cm. longo fulta, coccis delapsis ad 15 mm. longis, semine ellipsoideo, facie ventrali praesertim depresso, brunneo, in dorso longitudinaliter striato, 14 mm. longo, 9 mm. lato, caruncula minima, vix 1.5 mm. lata, 1 mm. longa.

MEXICO: Colima, Manzanillo Bay, "on rocky points," *Ferris 6140*, 1925 (TYPE, AA); Manzanillo, *Palmer 1027, 1027a*, 1890 (US, NY).

Palmer 1027a is cited by Pax & Hoffmann, as already noticed, under *M. carthagenensis*, which *M. colimensis* but superficially resembles. The

affinities of this new species are definitely toward *M. chlorosticta* Standl. & Gold., from which it is separated by the ellipsoid longer seed, a character which seems to hold good throughout, and by the range. *Manihot chlorosticta* bears to *M. colimensis* probably the same distributional and morphological relationship which *M. mexicana* bears to *M. parvicocca*. Critical forms between *M. chlorosticta* and *M. colimensis* may be looked for in Jalisco and Tepic.

Manihot chlorosticta Standley & Goldm. Contr. U. S. Nat. Herb. **13**: 375. 1911.

Manihot carthaginensis Standley, Contr. U. S. Nat. Herb. **23**: 643, *p. p.* 1923; non Jacq

I cannot follow Standley in merging *M. chlorosticta* and *M. carthaginensis* as one species, believing that the entities involved under these binomials are obviously different geographically as well as morphologically. A photograph of the type (*Nelson & Goldman* 7401, US) is available here and this collection perfectly matches two topotypes, *Brandeggee* 550, Lower California, San José del Cabo, Sept. 1890 (UC); *Brandeggee s.n.*, San José del Cabo, Lower California, Nov. 1902 (UC). I cannot separate the plant from Lower California from the plant of Sinaloa, as the seed of *Ferris & Mexia* 5218, Sinaloa, vicinity of Labradas, "woody vine near the railroad tracks," 1925 (AA) is absolutely the same as the seed of *Brandeggee* 550, the agreement among the other characters being otherwise of the closest. Likewise, the robust and long peduncle of the capsule of *Ferris & Mexia* 5218 and *Brandeggee* 550 is fully matched by that of *Rose* 3266, Sinaloa, between Rosario and Concepción, 1897 (US). I believe that *M. chlorosticta* is further represented by the following six collections, all from Sinaloa: *Rose* 3204, foothills of the Sierra Madre near Colomas, 1897 (US); *Rose s.n.*, road between Acaponeta and Rosario, 1897 (US); *Brandeggee s.n.*, Culiacan, Aug. 1904 (UC); *Ortega* 5586, El Pozole, 1925 (US); *Ortega* 6345, Escamillas, Aug. 1926 (UC, US); *Gentry* 5026, Cerro east of Culiacan, basaltic hill-slope in Short-tree Forest, "long smooth-stemmed succulent vine on trees and shrubs," Nov. 1939 (NY). The *Brandeggee* collection from Culiacan is somewhat doubtful under this binomial and may yet represent a new species. Its seeds are smaller than those of the plant of Lower California, and the infrutescence (unfortunately too young to allow a full comparison) is slightly different, manifestly racemose. It is possible, however, that the long and robust "peduncle" of the capsule of *M. chlorosticta* is in reality a persistent and accrescent section of the axis of the inflorescence which supports the lone fruit that ripens. The limits of *M. chlorosticta* in the direction of *M. intermedia* will bear close study.

Manihot rubricaulis Johnst. Contr. Gray Herb. **68**: 90. 1923.

According to Palmer's field-notes transcribed by Johnston on the type (GH), the type number, *Palmer* 224 (also US, UC) was collected near Durango City, "on the east slope of Iron Mt.," and taken from a many-stemmed shrub 4–5 ft. high, with leaves borne at the tip of the reddish-barked twigs. A collection from Sinaloa, *Brandeggee s.n.*, Cerro Colorado, Culiacan (UC) probably belongs here, despite its having dehiscent cocci somewhat longer (15 mm.) than those of typical material of Johnston's

species (12–13 mm.). The material is too poor even to attempt a varietal disposition of Brandegees plant.

Manihot isoloba Standley, discussed next, is quite near *M. rubricaulis* Johnst., although the two binomials are not manifestly synonymous. Both these species have a foliage with characteristically linear lobes, acute at the tip and here capped with a long bristle, the native name of *M. isoloba*, "pata de Gallo" (Rooster's foot), being very appropriate. The sinuses between the lobes are calloused and bear in many of the leaves of *M. rubricaulis* an abortive hydatode or gland.

Mueller Argoviensis gives of *M. microcarpa*, based upon a specimen of Karwinsky collected in Mexico without further indication of locality, a description (Flora 55: 42. 1872) which strongly suggests the characters of *M. rubricaulis*. In addition, Mueller compares the Karwinsky plant to *M. digitiformis* Pohl (Pl. Bras. Ic. Descr. 1: 36. Pl. 27. 1827), which is significant because Pohl's species has the foliage and the habit of *M. rubricaulis* and *M. isoloba*. It is probable that a study of the holotype of *M. microcarpa*, not now available, will prove that this species is synonymous with *M. rubricaulis*.

Manihot isoloba Standley, Field Mus. Publ. Bot. 17: 197. 1937.

The two collections cited by Standley in the original publication, *Gentry* 2372, Chihuahua, Guasaremos, Rio Mayo, 1936 (AA), and *Gentry* 1468, Sonora, Bakachaka, Rio Mayo (AA, UC, distributed as *M. angustiloba*), are available here. The foliage is almost identical to that of *M. rubricaulis*, differing from it, apparently, in the somewhat broader leaf-lobes, these being 5–8 in each leaf rather than 4–7, as in Johnston's species. The seed in *M. isoloba* is definitely less ellipsoid (10 mm. long, 8 mm. broad) than it is in *M. rubricaulis* (10 mm. long, 6.5 mm. broad), but the value of this character, given other close similarity between the two species, remains to be studied.

A collection represented by two sheets (US, NY) is *Townsend & Barber* 404, Chihuahua, Sierra Madre near Seven Mines, Sept. 1899. The material consists of detached leaves and seeds. The seed is a trifle bigger than that of *M. isoloba* (about 11 mm. long, 8 mm. broad, the difference being fairly noticeable at sight) and the lobes are up to 14 cm. long and 2 cm. broad, occasionally very shallowly repand. I find no reason at present to grant separate recognition to this plant, which may prove ultimately to be a variety of *M. isoloba* or of *M. rubricaulis* (= ? *M. microcarpa*). The ranges are: *M. rubricaulis* in Durango and Sinaloa; *M. isoloba* in Chihuahua and Sonora.

Manihot angustiloba (Torrey) Muell.-Arg. in DC. Prodr. 15(2): 1073. 1866; Pax & Hoffmann, Pflanzenr. 44 (iv. 147. ii): 83. 1910.

Janipha Manihot H. B. K. var. *angustiloba* Torrey in Emory's Rept., U. S. Mex. Bound. Surv. 2: 199. 1859.

Several species are manifestly included by Pax & Hoffmann in the range they give of this species, Oaxaca, Cuantla, Jalisco, New Mexico and, with doubt, "Acapulco in Peru." I have seen *M. angustiloba* only from Sonora, Chihuahua and Arizona, and suspect that the record from New Mexico is wholly based upon the erroneous label of *Wright* 1811. Wootton & Standley

exclude *Manihot* from their flora of this State (Contr. U. S. Nat. Herb. **19**. 1915), which I take to be correct. Tidestrom & Kittel overlook *M. angustiloba* in their recent flora of Arizona (Fl. Ariz. & New Mex. 718. 1941), listing only *M. carthagenensis* from the canyons of the Santa Catalina Mountains. This record applies in all probability to *M. Davisiae* Croiz., although it might include *M. angustiloba* to a very small extent. *Manihot acutiloba* Weatherby, cited by Pax & Hoffmann in the synonymy of *M. angustiloba*, has no status in nomenclature. In writing this binomial Weatherby intended to refer to *M. angustiloba*, the synonym taken up by Pax & Hoffmann thus proving to be a mere slip of the pen which is to be corrected as "a clearly unintentional orthographic error" (Art. 70, Intern. Rules Bot. Nomencl.) and otherwise disregarded. *Pringle 11318*, identified by the same authors as *M. angustiloba*, is *M. mexicana* Johnst., and is cited in the publication of this species.

Excluding the doubtful collection from "New Mexico" represented by *Wright 1811* (US, NY), which was probably taken on the Mexican side of the border in Sonora, I have seen the following material: (1) From Mexico — *Schott iii 8*, Sonora, Sierras oeste de Sta. Cruz y Tubac, 1855 (holotype, NY); *Schott s.n.*, Sonora, Potrero on the upper Sta. Cruz River (NY); *Palmer 233*, Sonora, Guaymas, 1887 (US, NY); *Gentry 2371*, Chihuahua, Guasaremos, Río Mayo, "One or two feet high, cespitose perennial with white flowers. On open knoll of thin gravel soil. Infrequent," 1936 (US, UC); *Wiggins 7155*, Sonora, 20 m. S.E. of Magdalena, 1934 (AA) — (2) From Arizona — *Lemmon s.n.*, Santa Catalina Mts. 1883 (US, UC); *R. E. Kunze s.n.*, Nogales, 1911 (US); *Thackery 487*, Baboquivari Flats, Pima Co., 1928 (AA, NY); *Peebles, Harrison & Kearney 4584*, Nogales, 1927 (US); *Harrison & Kearney 6031*, Nogales, 1929 (US); *Kearney & Peebles 8742*, Rincon Mts., 1932 (US, UC); *Harrison & Kearney 8904*, Santa Rita Mts., 1932 (US); *Kearney & Peebles 14928*, below Baboquivari Canyon, Pima Co., alt. 3100 ft., 1940 (NY).

All the Arizona and the majority of the Sonora and Chihuahua specimens are correctly determined. *Manihot angustiloba* reaches its northernmost distributional limits in southern Arizona, only one collection being reported from the Sta. Catalina Mountains; it is frequent in Sonora and rare in Chihuahua. Its affinities are with *M. mexicana*, but its seed is much larger.

The Guaymas plant has leaves and seeds that are a trifle larger than those of the form commonly found elsewhere. It remains to be seen whether these differences are important. A clue to the conditions of the specimens from Guaymas is given in a manuscript note on the sheet of the U. S. National Herbarium, reading: "Growing 2 or 3 ft. high, in the shade of high mountains above Guaymas." Under these conditions a large leaf is to be expected, and it is further probable that the plant from which the material was taken had grown in a habitat more favorable than the usual xerophytic or subxerophytic environment of the Arizona specimens.

***Manihot Davisiae* sp. nov.**

Frutex glaber, innovationibus herbaceis viridibus vel interdum levissime

pruinoso-glauculentibus. Foliis pro more 5-lobatis, majoribus ambitu toto ad 13–16 cm. magnis; lobis 2 infimis lanceolato-acutatis vel subabortivis quapropter magnitudine valde ludentibus, reliquis 4–9 cm. longis, 0.5–4 cm. latis, optime repandis, saepissime in lobis 2 dilatatis, quorum infero obtriangulari, 3 cm. lato vel minore, supero quadrangulato in apicem acutum vel subcaudatum brevissime aristulatum desinente ad 4 cm. lato, limbi parte communi integra 1 cm. tantum lata vel minore, inde lobis fere ad petioli radicem liberis; petiolo herbaceo 3–6 cm. longo, stipulis subsetaceis minimis. Inflorescentiis terminalibus herbaceis, gracilibus, ad 12–15 cm. longis, bracteolis linearibus sat persistentibus. Flore ♂: perianthio ca. 12 mm. longo, 6 mm. lato, lobis triangularibus sat acuminatis ca. 7 mm. longis, disco pistillodium minutum subtrigonum amplexente, 10-lobulato, margine incrassato, staminibus 10 in serie duplici, 6–8 vel 8–10 mm. longis. Flore ♀ ignoto. Capsula submatura ad 12–15 mm. magna, viva videtur globulosa, epicarpio sat tenui, semine haud optime maturo scaraboeo, haud applanato, basi ambitu paulo rotundato-inflato, inde seminis ipsius lateribus primo intuitu haud parallelis, 9 mm. longo, 7–9 mm. lato.

ARIZONA, Santa Catalina Mountains, *Lemmon s.n.*, Aug. 1883 (HOLOTYPE, US; isotype, UC); same locality, "Stony slope along Soldier's Canyon Trail, Soldier's Canyon," *Thornber s.n.*, 1910 (UA); same locality, The Basin, *Harris 16475* (US, NY); same locality, *Livingstons & Thornber s.n.*, Carillos Ranch, Nov. 1906 (UA); same locality, Sabino Canyon Trail, *Livingstons & Thornber s.n.*, 1908 (4 sheets, UA); Baboquivari Mts., *Peebles 8796*, 1932 (US).

The leaf of this plant is essentially different from that of *M. angustiloba* Muell. Arg. In *M. Davisiae* the leaf-lobes are dilated into 2 or 3 lobules, the apical lobule being especially noticeable; in *M. angustiloba*, on the contrary, the leaf-lobes are essentially linear or linear-acuminate in their general outline, being more or less irregularly lobulate only towards the base. This constant vegetative difference bespeaks in itself a specific difference which is so important as to remove *M. Davisiae* to an affinity (*M. chlorosticta*, as it seems) other than that of *M. angustiloba* (*M. mexicana*). In addition the two species differ in the seed. *Harrison & Kearney 8904* has a seed which is perfectly comparable to that of *Lemmon s.n.*, the holotype of *M. Davisiae*. The characters are: seed of *M. angustiloba*, 12 mm. long, 10 mm. broad, nearly oval in outline; seed of *M. Davisiae*, 9 mm. long, 7 to 9 mm. broad.

Manihot Davisiae has apparently the status of a relic-species, narrowly localized in the Santa Catalina Mountains, the classic locality, perhaps occurring much less frequently on the Baboquivary Mountains, the lowlands in this region being occupied by *M. angustiloba*. The distribution of these two entities would seem to follow altitudinal lines.

The specific epithet is for Mrs. Mary D. Davis of Tucson, Arizona, to whom I am indebted for data in connection with my work on this species.

At this writing, another *Manihot* sp. nov. from the range considered in this paper is in manuscript, ready for the press. This new species will be published by the Bulletin of the Torrey Club in the immediate future.

HEDYOTIS LINNAEUS VERSUS OLDENLANDIA LINNAEUS
AND THE STATUS OF HEDYOTIS LANCEA THUNBERG
IN RELATION TO H. CONSANGUINEA HANCE

E. D. MERRILL AND F. P. METCALF

With one plate

ALL botanists familiar with any considerable number of species placed under the generic names *Hedyotis* and *Oldenlandia* realize that, because of intergrading forms, or because certain specimens lack either flowers or fruits, it is often very difficult to separate the two genera with any degree of certainty. Many still recognize both generic names, while some would solve the problem by raising minor groups of both *Hedyotis* and *Oldenlandia* to generic status. Thus, if Bremekamp's criteria as to the delimitation of rubiaceous genera be applied to the group under discussion, it is not improbable that both *Hedyotis* and *Oldenlandia* might be retained, with, perhaps, a rather limited series of species in each, and many species now currently placed under one or the other transferred to other generic names. This being a possible contingency, while we believe that *Hedyotis* should be retained and *Oldenlandia* treated as a synonym, and that in this case a more or less "collective" genus is preferable to numerous smaller and often weak genera, we do not feel that the time has come to make wholesale transfers of *Oldenlandia* species to *Hedyotis*.

In 1891, both Otto Kuntze and K. Schumann accepted *Oldenlandia* as the proper generic name and transferred to the former many species originally described under *Hedyotis*. They, however, were working under the rule of strict priority, *Oldenlandia* having been described in 1737 while *Hedyotis* was not proposed until ten years later, both, of course, previous to the establishment of the binomial system in 1753. In 1753, Linnaeus recognized *Oldenlandia* with four and *Hedyotis* with three species. The present provisions of the International Code appertaining to the case were not in force in 1891.

It is suspected that a considerable number of botanists concerned with species in this group have more or less automatically accepted Kuntze's and Schumann's conclusions, for currently many species of *Hedyotis* are still being transferred to *Oldenlandia*. However, the provisions of the International Code of Botanical Nomenclature are clear that in cases of this kind, where two genera are united, the name that should be accepted is that selected by the individual who first combined the two groups. Lamarck and Sir James E. Smith both combined the two genera long before similar action was taken by Kuntze and by Schumann, and both selected *Hedyotis* in preference to *Oldenlandia*. In discussing the case in 1811, Smith (Rees Cyclop. 17: 1811) states: "Schreber advises their union, Gen. Pl. 820

[1791], and Lamarck, although he had previously described and figured them as distinct, finally in the letter-press to his plates, sinks *Oldenlandia* in *Hedyotis*." Lamarck is thus the first botanist to combine the two genera (Tabl. Encycl. I: 262-272. 1791), and he, as did Smith in 1811, accepted *Hedyotis* and transferred all the Linnean species of *Oldenlandia* to the former. He states: "Nous reunissons ici les Oldenlandes & les Hédýotes, parce qu'elles nous paroissent véritablement congénères," and before his conspectus of the species adds: "Huc Oldenlandias & Hedyotides Linnaei conjungimus; nobis enim videntur omnino congénères." We have, thus, a very clear case, for those who elect to follow the spirit and provisions of the International Code, in that if the two genera be combined *Hedyotis* Linn. *must* be accepted in preference to *Oldenlandia* Linn.

Through the kindness of Dr. C. G. Alm of the Botanical Garden and University Museum, Upsala, Sweden, we have been fortunate in obtaining photographs of the types of *Hedyotis lancea* Thunb. β and *Hedyotis lancea* Thunb. α ; the former, from Macao, is the holotype of *Hedyotis lancea* Thunb. ex Maxim. as described in 1883. The latter is represented by a Madagascar specimen collected by Oldenburg, which was not cited by Maximowicz, as it represents a different species with which students of the Chinese flora are not concerned.

It seems to be apparent that the Kwangtung *Hedyotis lancea* Thunb. ex Maxim., described from a Macao specimen collected by *Bladh*, has been misinterpreted. We believe that the material referred here by Dunn and Tutcher, other than the original Macao specimen which they did not see, does not represent Thunberg's species.

Judging from the photograph of the holotype and the characters as given in the original description, *Hedyotis lancea* Thunb. ex Maxim. seems to be identical with *Hedyotis consanguinea* Hance. There are two authentic specimens of *Hance* 978 from Whampoa available for study, one in the Gray Herbarium and the other in the Britton Herbarium, New York Botanical Garden. Neither of these represents the actual type collection, for the one in the Britton Herbarium was collected in April 1862, and the one in the Gray Herbarium was collected in April 1866, four years after Hance's description was published. Hance's type, the original of his no. 978, was collected at Whampoa in May, the year not indicated by him, but clearly earlier than 1862; thus the specimens of *Hance* 978 in the Gray and Britton herbaria represent re-collections of the species from the type locality. The description was actually published in Paris in the latter part of 1862. From these specimens of *Hance* 978 we are unable to distinguish *Hedyotis lancea* Thunb. ex Maxim. The latter may have been named before the close of the eighteenth century, but no description of it was published until 1883 when Maximowicz examined *Bladh*'s Macao specimen in Thunberg's herbarium on which his description is wholly based.

Numerous southern China specimens formerly placed as representing *Hedyotis lancea* Thunb. ex Maxim. apparently represent undescribed forms, which are considered below.

1. ***Hedyotis consanguinea*** Hance, Ann. Sci. Nat. IV. Bot. **18**: 221. 1862; Maxim. Bull. Acad. Sci. St. Pétersb. **29**: 162. 1883; Mél. Biol. **11**: 782. 1883; Dunn & Tutchér, Kew Bull. Add. Ser. **10**: 127. 1912 (Fl. Kwangtung and Hongkong). *Oldenlandia consanguinea* O. Kuntze, Rev. Gen. Pl. **1**: 292. 1891.
Hedyotis lancea Thunberg ex Maxim. Bull. Acad. Sci. St. Pétersb. **29**: 161. 1883, Mél. Biol. **11**: 780. 1883, syn. nov.
Oldenlandia lancea O. Kuntze, Rev. Gen. Pl. **1**: 292. 1891, syn. nov.

KWANGTUNG: Whampoa, *Hance* 978, April 1862, topotype of *H. consanguinea* Hance (N); same locality, *Hance* 978, April 1866 (G) and *Hance* s.n. (N); Macao, *Bladh* in herb. Thunberg, type of *H. lancea* Thunberg ex Maxim. (photograph A); China, "Rec'd. from Mr. Baird, Oct. 1829" (G).

2. ***Hedyotis caudatifolia*** sp. nov.

Hedyotis lancea sensu Dunn & Tutchér, Kew Bull. Add. Ser. **10**: 127. 1912, *pro parte*, non Thunberg ex Maxim.

Frutex erectus, glaber, circiter 0.5 m. altus, caudex lignosus; ramis cinereis vel albido-cinereis, teretibus, internodiis brevibus, ramulis viridibus, glabris, leviter striatis, ultimis circiter 1 mm. diametro; foliis plerumque lanceolatis, glabris, coriaceis, supra viridibus, subtus pallidioribus, 8–15 cm. longis, 1.5–2.5 cm. latis, sursum gradatim angustatis, caudato-acuminatis, basi cuneatis vel decurrento-acuminatis; nervis primariis utrinque circiter 4, gracilibus, acute adscendentibus, obscuris; petiolo 10–15 mm. longo, glabro; stipulis late ovatis, acutis vel abrupte acuminatis, margine minute glanduloso-serratis, haud laciniatis; inflorescentiis terminalibus, elongatis, paniculatis, glabris, multifloris, 7–15 cm. longis, deorsum plus minusque foliatis, ramis inferioribus 3–5 cm. longis, superioribus brevioribus; floribus cymosim dispositis, plerumque in triadibus in ramulis ultimis dispositis, breviter pedicellatis; calycis tubo ovoideo, 1.5 mm. longo, glabro, lobis 5, anguste lanceolatis, 0.5–0.75 mm. longis; corollae tubo cylindrico 4–5 mm. longo, extus glabro, intus puberulo, ore leviter barbato, lobis oblongo-lanceolatis, 1.5 mm. longis; staminibus 4, exsertis; capsulis septicide dehiscentibus, glabris, cum lobis calycinis persistentibus 4 mm. longis, et 2 mm. diametro.

KWANGTUNG: Ting Wu Shan, *W. Y. Chun* 6361, 6368, 6385 (TYPE), May 5, 1928 (all A), *Mell* 209, March 1918 (A), *CCC* 6379 (*Buswell, Levine & To*), April 15, 1921 (N), *S. Y. Lau* 20188, July 1932 (N); Sun-wui district, *Tso & Tsiang* 2001, April 11, 1928 (A, N); Loh Fau Mt., *Merrill* 10689, Aug. 9–27, 1917 (N); *T. M. Tsui* 29, March–April 1932 (A, N); Chung Shan, Nga Iu Mt., *LU* 19253 (*Tsang*), April 25, 1931 (N); Ah P'o Kai Shan, Sin fung district, *Y. W. Taam* 628, May 1938 (A); Naam Kwan Shan, Lung-moon district, *W. T. Tsang* 25321, June 1935 (A); Sam Kok Shan, Ts'ung-hua district, *W. T. Tsang* 25096, May 1935 (A); Nam Shan, Ho-yuen district, *W. T. Tsang* 28645, 28727, 28747A, April–May 1938 (A). KWANGSI: Shap Man T'ai Shan, Shangsze district, *W. T. Tsang* 22033, 22389, 22465, April, May and June 1933, 2nd Kwangsi expedition (all A); *W. T. Tsang* 24170, Sept. 1934, 4th Kwangsi expedition (A, N); Tong Shan, Waitsap district, *W. T. Tsang* 22712, Sept. 5, 1933, 3rd Kwangsi expedition (G); Seh-feng Dar Shan, S. Nanning, *R. C. Ching* 8101, Oct. 21, 1928 (A); Yao-shan, Ping Nan, *C. Wang* 39134, May 8, 1936 (A).

These specimens were for the most part determined and distributed as representing *Hedyotis lancea* Thunberg. As noted above, true *Hedyotis lancea* Thunberg is a synonym of the distinctly different and apparently rare *Hedyotis consanguinea* Hance. Our species is decidedly woody at the base, and is a much larger and more vigorous plant with distinctly petioled and larger leaves than typical *H. consanguinea* Hance; it is not very closely related to the latter, from which it can readily be distinguished also by its large and more abundantly flowered terminal inflorescences.

3. *Hedyotis minutopuberula* sp. nov.

Hedyotis lancea sensu Tanaka & Odashima, Jour. Soc. Trop. Agric. **10**: 382. 1938
(Contrib. Hort. Inst. Taihoku Imp. Univ. No. 24) non Thunb. ex Maxim.

Herbacea vel suffruticosa ad 0.5 m. alta; ramis et ramulis et inflorescentiis obscurissime minute puberulis, ramis teretibus; foliis submembranaceis utrinque viridibus, plerumque ovatis vel oblongo-ovatis, 3.5–5 cm. longis, 1.5–2 cm. latis, acutis vel obscure acuminatis, basi cuneatis vel decurrento-acuminatis, supra glabris, subtus subglabris vel minute puberulis; nervis primariis utrinque 3, gracilibus, acute adscendentibus, obscuris; petiolo 4–8 mm. longo, minute puberulo; stipulis ovatis vel lanceolatis, minute puberulis, caudatis vel attenuatis, 2–5 mm. longis, margine minute glanduloso-serratis; inflorescentiis terminalibus, cymoso-paniculatis, minute puberulis glabrescentibus, e basi ramosis, ramis primariis paucis, inferioribus ad 4 cm. longis; floribus numerosis in ramis primariis secundariisque racemoso-cymosim dispositis, pedicellatis; calycis tubo obovoideo, 1 mm. longo, minute puberulo, lobis acuminatis, lanceolatis, 1.5 mm. longis, persistentibus sub fructu ad 2.5 mm. longis; corollae tubo extus glabro, intus puberulo, ore barbato, lobis subovatis, 1 mm. longis; staminibus ad basim tubi corollae insertis; capsulis subglobosis vel obovoideis, minute puberulis vel glabris, 2 mm. longis, 1.5 mm. latis, septicide dehiscentibus.

HAINAN: Po-ting, *F. C. How* 73014 (TYPE, A), June 28, 1935, in thickets, the flowers said to be purplish red.

This specimen was tentatively referred to *Hedyotis lancea* Thunberg, but it is easily separated from both *Hedyotis consanguinea* Hance (*H. lancea* Thunberg ex Maxim.) and *Hedyotis caudatifolia* Merr. & Metc. by the minutely puberulent and obscure indumentum, the differently shaped leaves, very different inflorescences and different floral and fruit characters.

4. *Hedyotis longiexserta* sp. nov.

Herbacea vel suffruticosa e basi lignosa, stricte erecta, eramosa, glabra, ad 0.5 m. alta; caulibus teretibus, laevibus, deorsum 2.5 mm. diametro, sursum gracilioribus, internodiis inferioribus 2.5–4 cm., intermediis ad 15 cm. longis; foliis paucis, lanceolatis vel oblongo-lanceolatis, 5–7 cm. longis, 1–1.5 cm. latis, acuminatis vel acutis, basi late cuneatis vel obtusis, supra viridibus, subtus paullo pallidioribus; nervis primariis utrinque 3, obscurissimis vel cum reticulis subobsoletis; petiolo 3–5 mm. longo; stipulis late ovatis, inter foliis plus minusve connatis, circiter 3 mm. longis, abrupte et breviter apiculatis, margine integris, admodum obscure glandulosis; inflorescentiis terminalibus longissime exsertis, paniculatis, ad 20 cm. longis et 7 cm. latis, ramulis primariis racemosim dispositis, oppositis, distantibus, inferioribus ad 4 cm. longis, omnibus deorsum nudis, sursum cymosim ramulosis, bracteis linearibus, inferioribus ad 12 mm. longis, subpatulis; floribus albis, pedicellatis vel subsessilibus, calycis tubo ovoideo, glabro, 1 mm. longo, lobis triangulari-ovatis, acutis, vix 0.5 mm. longis; corollae tubo 1.5 mm. longo, extus glabro, intus dense barbellato, lobis late ovatis, rotundatis; capsulis plerumque oblongo-obovoideis, 2–2.5 mm. longis, 1.5 mm. diametro, septicide dehiscentibus.

KWANGSI: Shap Man Taai Shan, near Hoh Lung village, Shangsze district, *W. T. Tsang* 22574 (TYPE, A), June 27, 1933, 2nd Kwangsi Expedition, in meadows, flowers white, local name, *Tsak Ve Tan*.

The specimen on which this description is based was originally referred

to *Hedyotis lancea* Thunberg ex Maxim. but is totally unrelated to that species, being characterized by its very few leaves, these mostly two or three pairs near the basal parts of the stems, the upper pair or few pairs being separated by very long internodes, and its long exserted panicles composed of few, distant, somewhat spreading, primary branches which are naked for two-thirds to three-fourths of their length, the flowers being cymosely arranged at the ends of these primary branches.

EXPLANATION OF PLATE

- Fig. A. Portion of the holotype of *Hedyotis lancea* Thunb. ex Maxim. in herb. Thunberg; i.e. the *Bladh* specimen from Macao labelled by Thunberg *Hedyotis lancea*.
- Fig. B. Topotype of *Hedyotis consanguinea* Hance, *Hance* 978 in herb. Gray, Whampoa, April 1866 (this is not the type collection, which was made in or before 1862, but merely represents a re-collection of the species by Hance from the type locality four years after his description was published).

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.



A. HEDYOTIS LANCEA Thunberg



B. HEDYOTIS CONSANGUINEA Hance

STUDIES IN THE THEACEAE, XI KILLIPIODENDRON

CLARENCE E. KOBUSKI

IN SEPTEMBER 1941, a specimen of Theaceae collected by J. Cuatrecasas in Colombia was brought to my attention for determination. At first it appeared to be a new species of *Freziera*, an annoying situation, since my recent synopsis of the genus was already in page-proof. Upon dissection, the floral structure agreed very well with *Freziera* in most respects. The ovary was five-celled, a character not too unusual in *Freziera*, but the individual loculi apparently possessed very few ovules. A cross-section of an immature fruit showed only two developing seeds. This ovule and seed condition was so contrary to all species of *Freziera* hitherto examined that a request for more ample material was dispatched to the collector. Recently, fruiting material of the same collection has been received. The mature fruit proves to be a fleshy berry rather than a thin-shelled capsule and develops only five ellipsoidal seeds rather than the hundreds of tiny reniform seeds typical of *Freziera*. These amazing differences in ovary, fruit and seeds form the basic characters for *Killipiodendron*.

It is a pleasure to dedicate this new genus to Mr. E. P. Killip of the United States National Museum at Washington, D. C., whose interest and outstanding work on the flora of Colombia are well known to all students of the South American flora.

Killipiodendron, gen. nov.

Flores dioeci. Sepala 5, quincuncialiter imbricata, persistentia, pergamentacea, margine scariosa (non glanduloso-denticulata). Petala 5, sepalis alterna, basi ima coalita, in aestivatione imbricata. Flores staminati non visi. Flores pistillati: Staminodia uniseriata, antheris plane deficientibus. Ovarium liberum, sensim in stylum attenuatum, 5-loculare; ovula in quoque loculo 2, placentae in loculum medium intrusae affixae; stigmata 5-partita. Fructus baccatus. Semen in quoque loculo solitarius (6–7 mm. longus et 2–4 mm. diametro), ellipticus.

Arbor ramis alternis. Folia disticha alterna, serrato-crenata. Flores in axillis foliorum, 1-pauci-fasciculati, pedunculis basi bracteatis, apice bracteolas 2 persistentes gerentibus.

TYPE SPECIES: *Killipiodendron colombianum* Kobuski.

Killipiodendron colombianum, sp. nov.

Arbor ramulis griseo-brunneis rugosis villosis subflexuosis. Folia oblongo-ovata, crasso-coriacea, rugosa, disticha, 14–17 cm. longa et 5–6 cm. lata, supra glabrescentia (juvenilia dense villosa), subtus ferrugineo-villosa praesertim in costa venisque elevatis, apice acuta, basi aequalia et subrotundata, margine denticulata subrevoluta, costa profunde canaliculata (ad

2 mm. diam.), venis 30^+ paribus cum venulis profunde impressis, petiolis 2-3 cm. longis et 3-4 mm. diam. dense pubescentibus alatis, alis ad 2 mm. latis. Flores axillares, 2-3-fasciculati, in ramulis florigeris valde abbreviatis; pedicelli hirsuti, crassi, ca. 5 mm. longi, apice bracteolis 2 crassis, ovatis vel subrotundatis, concavis, 6-7 mm. longis et 5-6 mm. latis; sepala 5, imbricata, ca. 5 mm. longa et 5-6 mm. lata, pergamentacea, concava, rotundata vel ovata, margine scariosa, villosa, exteriora magis pubescentia; petala 5, imbricata, glabra, alba, subpergamentacea, ovata, ca. 6 mm. longa et 4-5 mm. lata, apice subacuminata; staminodia ca. 25, uniseriata; ovarium conicum, glabrum, ca. 3 mm. longum et 3 mm. diam., apice per stylum in stigma 5-partitum attenuatum, 5-loculare, loculis (ut videtur) 2-ovulatis. Fructus baccatus, globosus, niger, ca. 1 cm. plusve diam., 5-spermus; semina 5-7 mm. longa et 2-4 mm. lata, ellipsoidea, dorso convexa, ventre acuta.

DISTRIBUTION: South America (Colombia).

COLOMBIA. Dept. Huila, Cordillera Oriental, western slope between Gabinete and Andalusia, alt. 2200-2300 m., *J. Cuatrecasas* 8582 (TYPE, AA; isotype, US), March 24, 1940 (tree with distichous, coriaceous leaves; flowers white; fruit black)

The leaf-characters are very outstanding in this species. Very heavily coriaceous, the leaves are traced on the upper surface by a deeply channelled midrib and deeply impressed veins (30^+ pairs) as well as sharply defined cross-veins. On the very young leaves a ferrugineous pubescence covers the upper surface and persists on the upper midrib of some of the older leaves. Otherwise, the leaves are glabrescent above. The lower surface is invested over all with a ferrugineous villous pubescence and the veins, including the secondary and cross-veins, are highly elevated. The petiole is 2-3 cm. long and 3-4 mm. in diameter, winged, with the wings up to 2 mm. wide. The leaf-scars, along with the abbreviated flowering stem, cause the branchlets to appear subflexuose.

The bracteoles are densely pubescent, somewhat longer than the calyxlobes and about equally as wide. There seems to be a gradation in the density of pubescence from the bracteoles to the inner lobes of the sepals. The ovary, fruit and seeds have been discussed in the early portion of this paper.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

PLANTAE PAPUANAE ARCHBOLDIANAE, IX*

E. D. MERRILL AND L. M. PERRY

THIS paper covers the Myrtaceae (excluding *Octamyrtus* Diels, and a few incomplete specimens) of the Archbold Expeditions' collections not included in Mr. C. T. White's paper published in the last issue of this Journal, which was largely limited to a consideration of those genera characterized by having dry dehiscent fruits. Our work has been greatly handicapped owing to the unavailability of type-material, the consequent necessity of making our determinations from descriptions alone, and the large number of species already reported from New Guinea. The genera represented in these extensive and varied collections are *Decaspermum*, *Myrtus*, *Xanthomyrtus*, *Eugenia*, *Acmena*, *Syzygium*, and *Cleistocalyx*; of the latter genus only a single collection, *C. Baeuerlenii* (F. v. Muell.) Merr. & Perry, is represented, this from the type-region. In this work, we have again learned that mature fruit is more necessary than flowers for reasonably sure generic determination.

***Decaspermum* J. R. & G. Forster**

Diels, who has done more work on *Decaspermum* J. R. & G. Forst. than any other botanist except Blume, has indicated more than once the need of a monograph of this genus. Until such a study appears, with a fairly detailed evaluation of the essential characters, a certain amount of confusion and duplication in species is inevitable. We have at hand sufficient material to note the variation in characters, but not enough to ascertain the limits of such variation; we have found, however, that the number of locules characteristic of a single species appears more variable than is indicated in one key to the genus. On account of the limited authentic material and the lack of types for comparison, we have tried, wherever possible, to fit the collections, even if somewhat loosely on occasion, into the species already described from New Guinea.

***Decaspermum neurophyllum* Lauterb. & K. Schum. var. *leve* var. nov.**

A forma typica differt ramulis parce crispe pubescentibus, foliis fere glabris supra nitidis, venis primariis prominulis sed non prominentibus, inflorescentiae axi ramulisque parce tomentellis.

NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8899 (TYPE of var.), June 1938, alt. 20 m., common in seral growths of a gravelly river-bed (small tree; flowers pink; fruit soft, black).

In this collection, although the primary veins of the leaves are readily observed, they are not impressed above and not nearly so prominent on the lower surface as in the species (represented in the material at hand by

*Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **22**: 529-542. 1941.

Brass 4822, 4822A, 5330 from British New Guinea, and *Clemens* 149, *Kanehira* 4025, 4040, *Schlechter* 17496 from Northeastern New Guinea); the pubescence of the branchlets and of the inflorescence is short and somewhat crisp but sparser than in the collections representing *Decaspermum neurophyllum* Lauterb. & K. Schum. There seems to be little difference in the flowers or fruit. The ovary is 7- or 8-loculed, but 7-loculed flowers were also found in *Schlechter* 17496, which clearly represents the species.

Decaspermum Coriandri (Bl.) Diels, Bot. Jahrb. **57**: 372. 1922, vel aff.

Nelitris Coriandri Bl. Mus. Bot. Lugd.-Bat. **1**: 74. 1849.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5601, December 1933, alt. 100 m., rain-forest (slender small tree; flowers pale yellow with purple stamens). SOLOMON ISLANDS: Ysabel: Tataba, *Brass* 3429, 3526, January 1933, alt. 50 m., rain-forest ridges (small tree; leaves shining, the midrib pale and the margins slightly recurved; petals and stamens pink).

We are not wholly sure that the Solomon Islands material is conspecific with the New Guinea specimens; the primary veins of the leaves are slightly more manifest than in *Warburg* 20417 (identified by Diels as *Decaspermum Coriandri* (Bl.) Diels). The species has been reported only from New Guinea.

Decaspermum nitentifolium sp. nov.

Frutex vel arbuscula 1–3 m. alta; ramis glabris cinereis, ramulis novellis villosulis; foliis novellis albido-pilosis cito glabris petiolatis, petiolo 2–3 mm. longo, lamina coriacea, ovato-elliptica, 2–5 cm. longa 1.2–3 cm. lata, basi rotundata vel obtusa apice subabrupte breviter acuminata, supra nitida minute punctulata subtus opaca minute glandulosa, venis primariis ac vena intramarginali inconspicuis; inflorescentiis terminalibus ac in axillis foliorum superiorum dispositis folium aequantibus vel paullo superantibus; bracteis foliaceis, ramulis pedicellisq. $\pm$ pubescentibus; calycis tubo 1 mm. longo $\pm$ piloso, lobis 1 mm. longis, triangularibus obtusis parce pilosis vel glabris; petalis 3 mm. longis orbicularibus vel late ellipticis; ovario 7-loculari.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11643 (TYPE), December 1938, alt. 1600 m., common in low bushy second growths on rocky slopes (shrub or tree 1–3 m. high; petals white; filaments pink).

On account of the shining leaves (upper surface) we should have preferred to place this collection in *Decaspermum nitidum* Lauterb.; but, in our material the leaves are ovate-elliptic with a rounded base rather than oblong with an acute base; the new branchlets are loosely short-villous though quickly glabrate, and the sepals have very few hairs on the outer surface. These are perhaps all variable characters, yet, owing to the lack of agreement in so many points, we do not believe the collection is conspecific with *D. nitidum* Lauterb.

Decaspermum belense sp. nov.

Arbor 14 m. alta; ramis cinereis ramulis novellis villosulis cito tomentellis; foliis petiolatis, petiolo 3 mm. longo; lamina 3–6 cm. longa 1.3–2 cm. lata, lanceolata apice acuminata basi obtusa vel cuneata supra in sicco olivacea nitida subtus pallidiore opaca novella parce villosula maturitate glabra vel subtus consperse pilosa, venis primariis utrinque distincte

manifestis non prominulis; inflorescentiis axillaribus terminalibusque folium paullo superantibus, bracteis foliaceis, ramulis pedicellisque tomentellis; calycis tubo 1 mm. longo $\pm$ cinereo-pubescente, lobis 1 mm. longis, triangularibus glabris vel interdum parce pubescentibus; petalis 3 mm. longis, 2 mm. latis; ovario 5-loculari.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh 11135* (TYPE), November 1938, alt. 2380 m., occasional in primary forest (tree 14 m. high, 40 cm. diameter; crown small; bark brown, scaly; flowers white; fruit green).

This species suggests both *Decaspermum nitidum* Lauterb. and *D. leptanthelium* Diels. From the former it is distinguished by the obviously pubescent new growth, and fewer-loculed ovary. It differs from the latter in its coriaceous leaves, and longer, more copiously flowered panicles.

***Decaspermum exiguum* sp. nov.**

Arbuscula gracilis; ramulis novellis tomentellis; foliis novellis sericeis deinde glabratis demum supra glabris vel costa minute pilosa, in sicco fuscis, subtus glabris vel parce pilosis pallidioribus, petiolatis, petiolo breve 1–1.5 mm. longo, pubescente vel glabrato, lamina coriacea 1.4–4 cm. longa 0.8–1.3 cm. lata, lanceolata basi late cuneata vel obtusa apice anguste acuta vel subacuminata, nervis, costa excepta, obscuris; inflorescentiis terminalibus ac in axillis foliorum superiorum dispositis folia paullo superantibus, axi ramulis pedicellisque molliter breviter villosis vel subtomentellis; bracteis foliaceis; calycis tubo sericeo-villosulo 1 mm. longo, lobis 1 mm. longis anguste triangularibus acutiusculis $\pm$ pilosulis; petalis $\pm$ 3–4 mm. longis ciliolatis; ovario 5-loculari; fructu subdepresso-globoso.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass 4836* (TYPE), August 1933, alt. 2400 m., common in ridge-top forests (tall slender trunk with compact flattened crown; petals cream-colored; filaments pink; fruit immature).

In the leaf-outline and the short petiole this species approaches *Decaspermum Raymundii* Diels from Palau, but the leaves are coriaceous and their nerves with the exception of the midrib are obscure, also the flowers are a little smaller. Among New Guinean species *D. exiguum* is probably nearest to *D. nitidum* Lauterb. The latter, however, according to the description, is a more nearly glabrous species.

***Decaspermum Forbesii* Bak. f. Jour. Bot. 61: Suppl. 14. 1923.**

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass 4523*, July 1933, alt. 2840 m., common in forests (shapely tree 4–5 m.; leaves glossy above; petals cream-colored; immature fruit purple); same locality, *Brass 4543* (much branched thick-foliaged tree 5–6 m.; petals cream-colored; filaments purple; fruit black, slightly depressed; seeds red); Mt. Tafa, *Brass 4899*, August 1933, alt. 2400 m., plentiful in ridge-crest forests (tree 8–12 m. high; leaves glossy; petals white; filaments pink; fruit dark purple).

These three collections are too much like the description of *Decaspermum Forbesii* Bak. f. to be placed elsewhere without actual comparison with the type; yet, it is to be noted that the branchlets are clothed with a white somewhat shaggy pubescence, and the calyx-lobes are scarcely acute. In *Brass 4899* the leaves are more elliptic than ovate, 7–12 mm. long, 5–8 mm. wide, almost equally narrowed toward the base and the apex. Probably also belonging to this species is *Brass 4541* from Murray Pass, alt. 2840 m.

(virgate tree 3–5 m.; leaves pale and shining; petals cream-colored; filaments purple; fruit soft, black; seeds red). The leaves are 8–10 mm. long, 5–8 mm. wide; the ovary is 4-loculed.

***Decaspermum simile* sp. nov.**

Ut videtur arbor parva; ramulis atrofuscis, ramulis novellis pubescentibus vel tomentellis; foliis novellis praecipue costa margineque albido-pubescentibus cito glabris breviter petiolatis, petiolo vix 1 mm. longo, lamina 7–20 mm. longa 4–12 mm. lata, ovato-elliptica vel lanceolata apice acuta basi rotundata vel obtusa interdum cuneata margine leviter recurvata, in sicco supra atrofusca subtus pallidiore crebre minuteque glandulosa, costa supra impressa subtus prominula, nervis primariis inconspicue manifestis vel interdum obscuris; inflorescentiis terminalibus axillaribusque, pedicellis ramulisque tomentellis vel pubescentibus, bracteis foliaceis; calycis tubo + sericeo sub limbo leviter constricto, 1–1.4 mm. longo, lobis 1.5 mm. longis, subellipticis vel rotundatis; petalis 4–5 mm. longis 3 mm. latis; ovario 5–6-loculari.

NORTHEASTERN NEW GUINEA: Sarawaket, *Clemens* 5563, 5666a, 5575 (TYPE), March 1937, alt. 2400–2700 m.; Buni Tamunac Camp, *Clemens* 5303, January 1937, alt. 2100–2400 m.

Decaspermum simile is closely allied to *D. Forbesii* Bak. f., but differs in the short rather than shaggy pubescence of the younger branchlets and the inflorescence; the pubescence of the calyx-tube is not so copious and is more appressed than in the latter species, and the calyx-lobes are distinctly rounded.

***Decaspermum nivale* (Ridley) comb. nov.**

Myrtus nivalis Ridl. Trans. Linn. Soc. Bot. II. 9: 42. 1916.

Decaspermum humifusum Diels, Bot. Jahrb. 57: 371. 1922, Nov. Guin. 14: 88. 1924.

NETHERLANDS NEW GUINEA: Utakwa River to Mt. Carstenz, Camps X to XI, Kloss (phot. of type, and a very small fragment); Lake Habbema, *Brass* 9479, August 1938, alt. 3225 m., covering a precipitous rock face (habit prostrate; leaves smooth and shining; flowers white; fruit black, fleshy); 11 km. northeast of Wilhelmina-top, *Brass & Myer-Drees* 9734, 9810, September 1938, alt. 3400 m., alpine grassland (prostrate shrub covering sandy banks of stream; flowers white; fruit black and fleshy); 9 km. northeast of Lake Habbema, *Brass* 10921, October 1938, alt. 2800 m., very abundant on an old landslip (prostrate shrub; flowers white; plant usually sterile).

Although there is considerable variation in the size of the leaves (2–6 × 1.5–4 mm.), the number of stamens (15–30 in different collections), and the number of locules in the ovary (4–7, mostly 6 or 7), we believe the material all belongs to a single species. In the fragment of the type (a single leaf and flower just past anthesis) the leaf is 6 mm. long and 3 mm. wide, and the ovary is 6-loculed. When Diels described *Decaspermum humifusum* he had only Ridley's description as a working basis, and since he stressed the number of locules in the ovary (a character not mentioned by Ridley), it is easy to understand why he was at a loss to place Ridley's species.

Either conspecific or closely resembling this species is *Clemens* 5895 from Sarawaket, Northeastern New Guinea; the leaves (4–8 mm. × 2.2–5 mm.) tend to be ovate-elliptic and somewhat acute.

Myrtus Linnaeus

In the various reports on the Flora of New Guinea as many as nine species of *Myrtus* L., in its broader sense, have been attributed to the island. Three of these belong to *Decaspermum* J. R. & G. Forst., the rest are included in *Xanthomyrtus* Diels. A brief consideration of the published species of *Myrtus* L. is sufficient to show that the generic concept is either limited or inclusive depending upon the opinion of the individual worker. The collections at hand contain four species belonging to the complex. The flowers of two of these, in general characters, agree well with those of *Myrtus communis* L., the type-species of the genus. The flowers of the other two diverge somewhat in the stamen-characters; here, the stamens are short, not inflexed in the bud, the filaments vary in length and sometimes in size, the outer being the larger, the anthers are basifixed, the broad connective is continuous with the filament and, in addition, projects beyond the anther-sacs as much as 0.4 mm., causing them to appear lateral rather than apical as in most species of *Myrtus* L. We have scanned the literature and the available related material in an effort to discover whether such a difference has been noted before and if it might be considered a constant character. Among the specimens from New Caledonia are four species with the connective produced in varying degrees beyond the anther-sacs: *M. artensis* Beauv. & Guill., *M. nekouana* Guill., *M. emarginata* Panch. (i.e., part of the material so labeled, for we have no way of telling what the original was, all the specimens have been named in Paris), and *M. cinerea* Brongn. & Gris. In Guillaumin's latest revision of the Myrtaceae with fleshy fruits, Bull. Soc. Bot. France **85**: 626–653. 1938, this character of the elongated connective appears in the key to the species of *Myrtus* of New Caledonia and in the descriptions of some new species. This prolongation of the connective suggests a similarity with the American genus *Ugni* Turcz. Professor I. W. Bailey has very kindly examined the wood-structure and the stamens of the various species under consideration and he finds that *Ugni* Turcz. is differentiated from the other genera in the wood-structure and in having a single gland at the apex of the connective (all the others have glands in varying numbers over the dorsal part of the connective). In view of the variation within the group and the lack of sufficient material and time to make a comprehensive survey of *Myrtus* L. for generic and sectional lines, at present we believe it best simply to describe these four species from New Guinea as representing the genus *Myrtus* L.

Myrtus Randiana sp. nov.

Arbor parva dense foliata; ramis teretibus atrocinereis; ramulis brunnescentibus tenuibus 4 angulatis angustissime alatis; foliis glabris chartaceis copiose minuteque pellucido-punctatis lanceolatis, 4–6 cm. longis 0.8–1.1 cm. latis, basi acutis vel anguste cuneatis, apice obtuse elongato-acuminatis vel subrostratis abrupte apiculatis, costa utrinque prominula, venis primariis utrinsecus 6–11 subirregulariter dispositis utrinque subaequaliter manifestis, reticulis submanifestis, vena intramarginali 0.5 mm. a margine distante; petiolo $\pm$ 2 mm. longo; floribus axillaribus solitariis vel 2–4-

fasciculatis; pedunculis 1.5–2 cm. longis, tenuissimis apice bibracteatis, bracteis linearibus caducis; floribus non visis; fructibus crebre minuteque glandulosis subglobosis $\pm$ 5 mm. diametro calycis lobis coronatis; lobis 4 circiter 1 mm. longis obtusis; petalis . . . ; staminibus $\pm$ 3 mm. longis, filamentis filiformibus, antheris versatilibus late ovatis vix 0.4 mm. longis, connectivo apice glanduloso; disco staminifero angusto puberulo; ovario biloculari, ovulis paucis; semine uno subgloboso circiter 4 mm. diametro, testa crustacea nitida, embryo spirali habitu cochleato, cotyledonibus brevibus.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass 5642* (TYPE), December 1933, alt. 100 m., banks of stream in forest (small densely foliated tree).

The single-seeded fruit suggests that this species is perhaps related to *Myrtus acmenoides* F. v. Muell. and *M. monosperma* F. v. Muell. (not *M. nitida* Gmel. which, by Gaertner's plate, is a true *Syzygium*) of Australia. The species is readily distinguished from any other we have seen by the thin small narrowly lanceolate leaves with elongate obtuse but apiculate apices.

Named for Dr. A. L. Rand, the ornithologist of the Expedition.

***Myrtus Versteeghii* sp. nov.**

Arbor 12 m. alta; ramis fuscescentibus; ramulis novellis 4-angulatis apicem versus caesiis; foliis coriaceis glabris subinconspicue reticulatis suborbiculari-ovatis, 1.3–2.5 cm. longis 1–2 cm. latis, basi late cuneatis, apice brevissime acuminatis apiculatis, margine paullo recurvatis, supra olivaceo-brunnescentibus subtus pallidioribus, costa utrinque prominula, nervis primariis tenuibus utrinsecus 6–8 oblique adscendentibus prope marginem arcuatim confluentibus; petiolo $\pm$ 3 mm. longo; floribus subterminalibus atque in axillis foliorum superiorum dispositis, solitariis, pedunculis 1–1.5 cm. longis inconspicue pubescentibus, bracteis late linearibus calycis tubum subaequantibus; calyce dense adpresse albo-pubescente, tubo circiter 2 mm. longo, lobis 5 circiter 2 mm. longis rotundatis; petalis 5 subrotundatis 5 mm. longis, consperse glandulosis utrinque $\pm$ pubescentibus; disco stamineo pubescente; filamentis filiformibus, antheris versatilibus rotundatis, connectivo haud producto angusto apice minute glanduloso; stylo subulato stamina vix superante basi pubescente; ovario biloculari; fructibus elongato-globosis vel ellipsoideis 1 cm. longis 0.8 cm. diametro calycis lobis coronatis.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh 10150, Brass 10018* (TYPE), 10930, October 1938, alt. 2800 m., mossy forest, occasional in tall forest of slopes, common in more open parts of forest (substage or subsidiary tree 4–12 m. high, 20–24 cm. diameter; flowers white, young fruit black).

The fruits of these collections are either immature or abnormal and without well developed seeds. The habit of the species strongly suggests that of *Myrtus inophloia* Bail. f. & White as shown in Queensl. Dep. Agr. Bot. Bull. **19**: 8, *t.* 3. 1917, but the bark is not loose and thready, although the very narrow wings on the new branchlets soon break away, the leaves are glabrous and a little less acuminate, and the petals are more or less pubescent on both sides rather than fringed. At the apex of the pedicels and at the point of attachment of the leaves or perhaps at the base of the axillary buds are long (0.5–1 mm.) black subulate glands or bracts.

Myrtus Brassii sp. nov.

Arbor usque 8 m. alta; ramulis dense crispule hirtellis dense foliatis; foliis coriaceis novellis pilosis mox glabratis maturis minute glandulosis glabris vel subtus ad basim praecipue costa consperse breviter pilosis, lanceolatis vel anguste ovatis, 8–14 mm. longis 4.5–6 mm. latis, basi obtusis vel rotundato-cuneatis, apice acutis vel acute acuminatis, costa supra impressa subtus distincta, nervis obscuris; petiolo 1–1.5 mm. longo hirtello; floribus axillaribus solitariis; pedunculis vix 2 mm. longis pubescentibus; calyce minute pubescente dense glanduloso, tubo 2 mm. longo campanulato, lobis 5 late obtuseque triangularibus circiter 1.5 mm. longis; petalis 5 $\pm$ rotundatis circiter 3 mm. diametro, glabris consperse glandulosis; staminibus brevibus $\pm$ 2.5 mm. longis numerosis pluriserialibus, filamentis in connectivum confluentibus vix infra antheras dilatatis dein in apicem liberum (0.4 mm.) glanduloso-mucronatum productis, connectivo extus consperse glanduloso; ovario 3-loculari; stylo subulato circiter 3 mm. longo; stigmatibus anguste capitato quam stylo vix latiore; fructibus globosis calycis lobis coronatis; seminibus crustaceo-osseis subreniformibus tessellato-rugosis.

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass 4514* (TYPE), July 1933, alt. 2840 m., very plentiful in the forests (spreading virgate tree up to 8 m. tall; leaves dark and shining above, paler beneath; flowers white; fruits dull black, fleshy, depressed, up to 1 cm. diameter); Mount Tafa, *Brass 4853*, August 1933, alt. 2700 m., fringe of forest just below cleared summit (small tree about 3 m. high).

This species is superficially somewhat like *Myrtus nekouana* Guill. of New Caledonia, but the latter has obtuse leaves, appressed pubescence, longer pedicels, and less modified stamens, the connective being only very little produced beyond the anther-sacs.

Myrtus Archboldiana sp. nov.

Arbor usque 5 m. alta; ramis $\pm$ atro-cinereis; ramulis dense subadpresse albo-villosulis; foliis tenuiter coriaceis novellis sericeis mox glabratis, maturis glabris vel costa pilosis ovato-lanceolatis, 3–4.5 cm. longis 1–2 cm. latis, basi obtusis, apicem versus subabrupte caudato-acuminatis, acumine 1–1.5 cm. longo apice acutissimo, in sicco rubro-brunnescentibus subtus minutissime glandulosis, costa supra impressa subtus prominula, nervis primariis vix manifestis; petiolo $\pm$ 2 mm. longo albo-villosulo; floribus solitariis in axillis foliorum superiorum dispositis; pedunculis 5–8 mm. longis, adpresse breviter pilosis; calyce adpresse breviter piloso consperse glanduloso, tubo campanulato 2 mm. longo, lobis 5 circiter 1.5 mm. longis obtusis; petalis 5 subrotundatis circiter 5 mm. diametro glabris consperse glandulosis; staminibus brevibus numerosis pluriserialibus, filamentis in connectivum confluentibus vix infra antheras dilatatis dein in apicem liberum productis, connectivo extus consperse glanduloso; ovario 3-loculari, stylo $\pm$ 4 mm. longo basi pubescente; stigmatibus subglobosis vix quam stylo latiore; fructibus subglobosis immaturis.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass 4101* (TYPE) May–September 1933, alt. 2300 m., plentiful in mossy forest (virgate tree up to 5 m.; leaves yellowish green, nerves obscure and midrib impressed above; flowers white, later pink).

This species and *M. Brassii* have very similar flowers but they are amply distinct in their vegetative characters.

Xanthomyrtus Diels

The specific lines in this genus may appear to be more clearly cut when more material has been collected. The key-character, 2-loculed and 3-loculed ovary, is without value as both may occur on the same plant.

Xanthomyrtus fasciculata Diels, Bot. Jahrb. **57**: 363. 1922; Nov. Guin. **14**: 85. 1924; van Steenis Bull. Jard. Bot. Buit. III. **13**: 230. 1934.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh* 10499, October 1938, alt. 2700 m., frequent in forest (tree 16 m. high, 29 cm. diameter; bark brown, scaly; young fruit brown). BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass* 4039, May 1933, alt. 2300 m., common in mossy forest (slender tree 5 m. tall, with dark flaky bark; leaves shining, black dotted beneath; fruit dark purple-red); same locality, *Brass* 4892, August 1933, alt. 2400 m., plentiful in ridge crest forest (small twiggy tree up to 7 m.; pale smooth obscurely nerved leaves; numerous small black fruit).

These specimens agree with the description of *Xanthomyrtus fasciculata* Diels except that the leaves are a little smaller ($2-3.5 \times 0.7-1.5$ cm., with acumen 0.7-1 cm. long) than in the type ($3.5-4.5 \times 1.6-2.2$ cm., with acumen 1 cm. long), and the inflorescence is longer pedunculate (4-6 mm., in contrast to 1-1.5 mm. in the original); in the material at hand the latter seems to be a variable character; further it might be noted that Stapf described the pedicels in *Myrtus flavida* as " $\frac{1}{2}$ -2 lin. longi, vel subnulli."

Xanthomyrtus rostrata sp. nov.

Arbor; ramulis glabris minute pustulatis; foliis magnis tenuiter coriaceis petiolatis, petiolo 3-4 mm. longo, lamina 2.5-5.5 cm. longa 1.3-3 cm. lata, late elliptica basi obtusa, in laminis majoribus apice abrupte in acumen angustum (0.8-1.3 cm. longo) excurrente, in minoribus apice acutiuscula, margine paululo recurva subtus copiose minute atro-glandulosa, costa supra paululo elevata subtus distincta, nervis primariis oblique adscendentibus atque vena intramarginali inconspicuis; cymulis glabris plerumque binis axillaribus pedunculatis, pedunculo $\pm$ 1 cm. longo, bracteis caducis; calycis tubo 2 mm. longo, lobis triangularibus acutiusculis 1.5 mm. longis basi circiter 1.5 cm. latis, petalis (uno tantum marcido viso) unguiculatis probabiliter 2.5-3 mm. longis; staminibus $\pm$ 25; ovario 2-loculari.

NORTHEASTERN NEW GUINEA: Matap, *Clemens* 11131 (TYPE), February 1940, alt. 1500-1800 m. (tree with diameter 14 inches breast high; flower faded, base and segments dull wine-purple).

Although the specimen is somewhat fragmentary, we are unable to match it with either material or descriptions. It is perhaps closest to *Xanthomyrtus polyclada* Diels, but the leaves are broadly elliptic, not lanceolate, and the entire specimen (including the new shoots) is glabrous.

Xanthomyrtus Schlechteri Diels, Bot. Jahrb. **57**: 364. 1922, van Steenis, Bull. Jard. Bot. Buitenz. III. **13**: 231. 1934.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh* 10491, October 1938, alt. 2680 m., frequent in forest of valleys, (tree 12 m. high, 25 cm. diameter; bark brown, fairly smooth; fruits yellow-green); 18 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12504, February 1939, alt. 2080 m., occasional in primary forest on slope of ridge (tree $\pm$ 17 m. high, 43 cm. diameter; bark brown, scaly; fruit green); 6 km. southwest of Bernhard Camp, Idenburg River,

occasional subsidiary tree on steep slopes ($\pm$ 15 m. high, 20 cm. diameter; flowers yellow).

The original description of this species, based on Schlechter's collection from the Finisterre Mountains, seems to fit the above cited specimens reasonably well. Previously known only from the type-material.

Xanthomyrtus longicuspis Diels, Bot. Jahrb. **57**: 364. 1922; Nov. Guin. **14**: 85. 1924; Lane-Poole, Rep. For. Res. Papua 128. 1925; Lam, Nat. Tijdschr. Nederl.-Ind. **89**: 91, 138. 1929; van Steenis, Bull. Jard. Bot. Buitenz. III. **13**: 231. 1934.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 12971*, February 1939, alt. 1300 m., subsidiary tree (15 m. high; leaves very convex; flowers yellow).

Xanthomyrtus longicuspis var. **fruticosa** Diels, Bot. Jahrb. **57**: 364. 1922; Nov. Guin. **14**: 85. 1924.

NORTHEASTERN NEW GUINEA: Morobe District, Samanzing, *Clemens 9290*, November 1938, alt. 1650 m. (a whip-like shrub branched near the base; flowers bright yellow; terminal leaves reddish).

Previously recorded from Netherlands New Guinea.

Xanthomyrtus scolopacina (Ridley) Diels, Bot. Jahrb. **57**: 365. 1922.

Eugenia scolopacina Ridl. Trans. Linn. Soc. Bot. II. **9**: 49. 1916.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12631*, February 1939, alt. 2150 m., mossy forest, a common subsidiary tree and one of the chief components of stunted scrubs on an exposed summit (tree 2-12 m. high; leaves convex, fruit purple-black).

We have recorded our scanty material of *Xanthomyrtus longicuspis* var. *fruticosa* Diels and *X. scolopacina* (Ridl.) Diels with the hope that someone with access to some of the duplicates and authentic type-material will kindly point out the essential differences between them, if any. *Xanthomyrtus longicuspis* Diels appears to be readily distinguishable by the long caudate acumen of the leaf. This is not quite so long in var. *fruticosa* Diels, and furthermore the branchlets are very slender. In the specimen assigned to *X. scolopacina* (Ridl.) Diels, the branchlets are a little stouter than in *X. longicuspis* var. *fruticosa* Diels, but both have very short axillary inflorescences and the leaves are very much alike; in *X. scolopacina* (Ridl.) Diels, however, the leaves, although in part pointing forward, are predominantly reclinate, a character emphasized by Diels in the description of *X. Pullei* Diels. Further material to show variation, in addition to access to the types, would be most helpful in any attempt clearly to define the species and variety here involved.

Xanthomyrtus lanceolata sp. nov.

Arbor 14 m. alta; ramulis novellis albo-villosis, vetustis cinereis glabratiss; foliis novellis parce albo-villosis interdum cito glabratiss vel demum glabratiss petiolatis, petiolo 2-3 mm. longo $\pm$ villosulo vel glabrato, lamina coriacea 2.5-5.5 cm. longa 0.7-1.7 cm. lata, basi obtusa vel rotundato-cuneata apice anguste acuminata, acumine 0.7-1.5 cm. longo, margine non recurva, utrinque glabrata vel subtus consperse villosula, costa utrinque prominula, nervis primariis atque vena intramarginali inconspicuis; floribus non visis; baccis parce pubescentibus solitariis axillaribus $\pm$ 3.5 mm. diametro, calycis lobis (1.5 mm. longis vix 1.5 mm. latis) coronatis, breviter pedunculatis vel subsessilibus.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh 11109* (TYPE), November 1938, alt. 2250 m., occasional in primary forest (tree 14 m. high, 32 cm. diameter; bark scaly, slightly fissured; fruits greenish brown).

In the size, shape and indument of the leaves, this species suggests *Xanthomyrtus polyclada* Diels, although in the latter the leaves are described as chartaceous. In our species the leaves are coriaceous and it seems worth mentioning that this is the only species we have seen in which the glands of the leaves are obscure; the fruit, nevertheless, is surely that of *Xanthomyrtus*. The almost sessile single fruits might indicate that this species is related to *X. longicuspis* Diels. Flowering material is needed to clarify its position in the genus.

Xanthomyrtus flavida (Stapf) Diels; Merr. Sarawak Mus. Jour. **3**: 533. 1928; van Steenis Bull. Jard. Bot. Buitenz. III. **13**: 230. 1934.

Myrtus flavida Stapf in Hook. Ic. **23**: t. 2290. 1894; Trans. Linn. Soc. Bot. II. **4**: 151. 1894.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass 4036*, May 1933, alt. 2300 m., common in mossy forest (erect tree 12–15 m. tall; leaves aromatic, upper side glossy, punctate and paler beneath; old leaves red; calyx purple).

This collection compares favorably with the larger-leaved specimens of *Xanthomyrtus flavida* (Stapf) Diels from Borneo. The younger branchlets, petioles, and midrib on the lower surface of the leaves are short-villous, the leaf-blade tends to be more concave and the margins more recurved than in the Bornean species, and the glands on the lower surface are a little larger and more irregularly placed in the New Guinea material. The fruits have 26–30 stamens still clinging to them and about the same number of seeds as in the Bornean collections. At present we cannot see sufficient differences to separate *Brass 4036* from the Bornean species.

Xanthomyrtus cardiophylla sp. nov.

Frutex 1.5 m. altus epiphyticus; ramulis minute pustulatis apice tantum albido-pubescentibus; foliis coriaceis magnis breviter petiolatis, petiolo 1–1.7 mm. longo atrofusco, lamina cordato-ovata, 3.7–7 cm. longa, 2–4.2 cm. lata, apice acutiuscula vel $\pm$ abrupte breviter obtuseque acuminata, acumine 0.5–0.8 cm. longo, margine leviter recurva, glabra supra punctulata subtus minute glandulosa, costa utrinque prominula, venis primariis manifestis oblique patentibus, venis intramarginalibus duplicibus prominulis cujus exteriori superne evanescente; cymulis singulis vel binis axillaribus terminalibusque interdum in internodio dispositis pedunculatis, pedunculo 1–2 cm. longo parce adpresse piloso leviter pustulato; bracteis basi tubi calycini ellipticis vel ovatis $\pm$ 3 mm. longis 2 mm. latis (in cyma una usque 1 cm. longis 0.7 cm. latis); calycis tubo parce pilosulo vel glabro 2–2.5 mm. longo, lobis triangularibus 1–1.5 mm. longis basi 1.5 mm. latis; petalis breviter unguiculatis 2 mm. longis 1.5 mm. latis; staminibus $\pm$ 25, filamentis circiter 2 mm. longis; ovario 2-loculari; baccis $\pm$ 8 mm. diametro.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13452* (TYPE), March 1939, alt. 850 m., rain-forest (stiff shrub 1.5 m. tall, epiphytic on a tall tree; flowers yellow; fruit soft, black).

This is the only species we have noted with distinctly cordate and prac-

tically sessile leaves. The venation too is rather striking; toward the base of the leaf the two intramarginal nerves are almost as prominent as the midrib, and sometimes there is a third outside of these very close to the margin and very faint, but only the inmost one continues to the apex while the other gradually approaches the margin and fades near the middle of the leaf; the primary veins are easily seen but are not so prominent as the midrib and the intramarginal ones.

Diels has described one species as epiphytic(?). Its broadly ovate leaves are 1–1.5 cm. long and 0.5–1 cm. wide. He does not mention the shape of the base of the leaf, but the flower is somewhat smaller than in our specimens and has only about half the number of stamens; although the latter is a variable character, without authentic material for comparison we could not possibly fit our plant with the description of *Xanthomyrtus bryophila* Diels.

***Xanthomyrtus cardiophylla* var. *parvifolia* var. nov.**

A forma typica differt foliis 1.8–4 cm. longis 0.9–2.4 cm. latis, cymulis 1-floris, pedunculis usque 1 cm. longis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12057* (TYPE of var.), January 1939, alt. 1800 m., mossy forest, abundant as an epiphyte on high trees (slender shrub 1–1.5 m. high; flowers yellow; fruit black, fleshy).

***Xanthomyrtus humilis* sp. nov.**

Frutex humilis 1 m. altus; ramulis leviter pustulatis novellis adpresse pubescentibus; foliis interdum reclinatis coriaceis petiolatis, petiolo 1–1.5 mm. longo primo pubescente demum glabrato, lamina 1–1.7 cm. longa, 0.5–1 cm. lata, ovata vel elliptico-ovata apice abrupte breviter ac obtuse acuminata, acumine 2–3 mm. longo, basi obtusa vel rotundata, margine recurva vel interdum revoluta novella utrinque pilosula vetusta supra glabra punctata subtus praecipue costa $\pm$ pilosula glandulosa, costa supra impressa subtus prominenti, nervis primariis in lamina novella $\pm$ prominulis invetusta inconspicuis; inflorescentiis axillaribus terminalibusque interdum in internodio locatis; floribus in dichasiis simplicibus (cymis ultimis 1–3-floris) dispositis, dischasiis ramis basi bracteatis, vel floribus solitariis; pedunculo usque 3 mm. longo pubescente; bracteis basi floris linearibus pubescentibus quam calycis tubo brevioribus; calycis tubo parce pubescente 2 mm. longo, lobis anguste triangularibus 1.5–2 mm. longis 1 mm. latis extus glabris vel consperse pilosulis; petalis vix 3 mm. longis breviter unguiculatis; staminibus $\pm$ 20, filamentis circiter 4 mm. longis; ovario 2-loculari; placentis circiter 12-ovulatis; baccis $\pm$ 5 mm. diametro.

NETHERLANDS NEW GUINEA: Balim River, *Brass 11784* (TYPE), December 1938, alt. 1700 m., abundant on stony grassless hillsides (low spreading, sometimes scrambling shrub 1 m. high; flowers yellow; fruit black, fleshy).

Perhaps this species is related to *Xanthomyrtus Pullei* Diels. The flowers of *X. humilis* Merr. & Perry are larger, the leaves are broader, and only a part of them are reclinate, the others being spreading or ascending. In size and outline, the leaves correspond very well to the description of those of *X. bryophila* Diels, but this has a much smaller flower than our species. This is the only species of the genus we have seen with a branching inflorescence.

Xanthomyrtus papuana sp. nov.

Arbor 12–20 m. alta; ramulis numerosis $\pm$ pilosis atque dense verruculosus; foliis petiolatis, petiolo 2–3 mm. longo glabro vel piloso, lamina tenuiter coriacea 1.1–1.6(–2) cm. longa 0.7–0.9(–1.2) cm. lata elliptica basi cuneata apice obtusa margine valde recurva interdum revoluta, novella villosula cito glabrata, vetusta glabra vel subtus costa praecipue interdum basim versus laminae consperse pilosa, supra olivacea subnitida subtus brunnescente dense minuteque glandulosa, costa utrinque prominula, nervis primariis inconspicuis subtus interdum manifestis; cymulis 1–3-floris axillaribus terminalibusque pedunculatis, pedunculo 4–10 mm. longo $\pm$ villosulo, bracteis basi calycis tubi linearibus $\pm$ pilosis; calycis tubo 2 mm. longo villosulo, lobis extus glabris anguste triangularibus 2 mm. longis basi 1 mm. latis; petalis 3 mm. longis 1.5 mm. latis unguiculatis; staminibus 20–25, filamentis $\pm$ 5 mm. longis; ovario 2–3-loculari; baccis late globosis circiter 5 mm. diametro, calycis lobis coronatis.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass* 10584, October 1938, alt. 2800 m., common in forest substage (tree 18–20 m. high; leaves convex and margins recurved; flowers yellow); same locality, *Brass* 10652 (TYPE, fls.), 10653 (fr.), October 1938, alt. 2900 m., mossy forest of ridges (slender substage tree to $\pm$ 12 m. high; leaves convex, the margins much recurved; flowers yellow).

From the descriptions of the Papuan species of *Xanthomyrtus*, we believe *X. papuana* to be more like the Philippine *X. diplycosifolia* (C. B. Rob.) Merr. (including *X. aurea* (Elm.) Merr., which we are now inclined to believe cannot be maintained as a distinct species) than any of the Papuan ones. It differs in the revolute character of the leaves, the more pubescent inflorescences, and the longer narrower calyx-lobes.

Two collections from Northeastern New Guinea probably belong here, but we cannot be sure of the determination of almost sterile material: Sarawaket, *Clemens* 5588, 5755, March and April 1937, leaves and a single detached fruit.

Xanthomyrtus papuana var. **parviflora** var. nov.

A forma typica differt partibus novellis parce pubescentibus, floribus paululo minoribus, calycis tubo 1.5 mm. longo, lobis 1.5 mm. longis, staminibus 15–25; foliis 0.8–1.7 cm. longis, 0.3–0.9 cm. latis.

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass* 4521, 4573 (TYPE of var.), 4629, July 1933, alt. 2840 m., common in forests (compact dense foliated tree up to 7–8 m. with flaky brown bark, profuse bright yellow flowers, smooth shining purple fruit. Fruit of 4521: black, soft, 5 mm. diameter).

In this material from Murray Pass, on both the new growth and the inflorescence, the trichomes are shorter and more sparse than in the collections from Lake Habbema region; the flowers and also the leaves are a little smaller. It does not seem, however, from the specimens at hand, that more than one species is represented.

Xanthomyrtus Dielsiana sp. nov.

Frutex vel arbor parva; ramulis numerosis verruculosus novellis albo-pubescentibus; foliis parvis confertis coriaceis petiolatis, petiolo 1–1.5 mm. longo, lamina 4–6(–9) mm. longa 2.5–4 mm. lata anguste ovata vel lanceolato-elliptica, apice obtusa basi rotundata vel obtusa, margine revoluta interdum tantum valde recurva, novella apicem versus ramulorum

pilosula mox glabrata, supra interdum punctulata subtus glandulosa, costa supra impressa subtus $\pm$ inconspicua, nervis primariis obscuris; cymulis trifloris vel floribus solitariis in axillis foliorum superiorum dispositis interdum subterminalibus basi bibracteolatis, bracteolis lineari-oblongis pilosulis calycis tubo subaequilongis vel brevioribus; calycis tubo extus pilosulo intus consperse pilosulo 2–2.5 mm. longo, lobis anguste triangularibus 2–2.5 mm. longis basi 1–1.5 mm. latis; petalis luteis conspicue unguiculatis $\pm$ 4 mm. longis 3 mm. latis; staminibus $\pm$ 27, filamentis circiter 5 mm. longis, antheris parvis; ovario 2-(interdum 3-) loculari; placentis circiter 12-ovulatis; baccis $\pm$ 5 mm. diametro.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9018, 9269 (TYPE), 9462, August 1938, alt. 3225 m., the principal tree or shrub on drier peaty ridges (2–3 m. high; branches upright; flowers yellow); 7 km. northeast of Wilhelmina-top, *Brass & Myer-Drees* 9625, 9904, September 1938, alt. 3560 m., subalpine forest (tree 5–10 m. high; bark when not covered with moss peeling in brittle brown flakes; corolla, anthers and stigma dark yellow; fruit blackish blue); 11 km. northeast of Wilhelmina-top, *Brass & Myer-Drees* 9641, September 1938, alt. 3400 m., subalpine forest (6 m. high; fruit dark blue); 2 km. east of Wilhelmina-top, *Brass & Myer-Drees* 10125, September 1938, alt. 3800 m., common on creviced faces of sandstone (dwarfed tree 1–2 m. high; leaves convex; flowers yellow; fruit black, fleshy); same locality, *Brass & Myer-Drees* 10377, September 1938, alt. 3700 m., edge of subalpine forest (shrub with leaves somewhat whitish beneath; ripe fruit dark blue); 6 km. northeast of Lake Habbema, *Brass* 10665, October 1938, alt. 3000 m., shrubberies on a peaty depression in forest (subprostrate shrub; flowers yellow).

In the dried specimens this species has a distinct habit. In all but three numbers (10125, 10377, 10665) the leaves are so strongly revolute that only a narrow strip of the lower surface is visible, and the upper part of the branchlets appears greyish or whitish, owing to the very fine pubescence on both leaves and branchlets. This pubescence at length disappears, as it is not present on the older parts, yet it can hardly be considered to be quickly evanescent, as it occurs on some branchlets bearing fruits. In nos. 10125 and 10377, the leaves are somewhat revolute or have strongly recurved margins, superficially suggesting *Xanthomyrtus arjakensis* (Gibbs) Diels, as represented by *Kanehira* 13565 from the Angi Lakes. The flowers of the latter, however, are readily distinguished from those of our species by the shorter and more rounded calyx-lobes and also by the glabrous character. Among the species described by Diels, *X. Dielsiana* seems to share in some of the characters of both *X. linnaeifolia* and *X. calytrichoides*. The flowers of *X. linnaeifolia* Diels are smaller than those of our species. The latter differs from *X. calytrichoides* Diels in the constantly pubescent tips of the branchlets, the somewhat narrower leaves with revolute rather than recurved margins, and the occurrence of the inflorescences only occasionally at the apex of the branchlets although always to be found on the upper part. The flowers occur both singly and in cymes, sessile in the axils of the leaves or on peduncles up to 5 mm. long.

Xanthomyrtus Klossii (Ridl.) Diels, Bot. Jahrb. **57**: 366. 1922; Nov. Guin. **14**: 86. 1924; Lam, Nat. Tijdschr. Nederl.-Ind. **89**: 72. 1929; van Steenis, Bull. Jard. Bot. Buitenz. III. **13**: 230. 1934.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass* 10521, October 1938, alt. 2850 m., mossy forest, common on crests of ridges (tree 5–7 m.

high; branches horizontal; flowers yellow); same locality, *Brass* 10523 (immature fruit); same locality, *Brass* 11001, October 1938, alt. 2900 m., very abundant in open stunted mossy forest of crests (shrub or low flat tree 1–3 m. high).

These specimens agree reasonably well with Diels' somewhat amplified description of this species. In *Brass* 10521 the leaves are a little larger (6–14 mm. $\times$ 4–6 mm.) than either Diels or Ridley describe them, but the specimen is surely conspecific with the others cited here. Ridley indicates no variation at all in the leaf-size (5 mm. $\times$ 3 mm.).

***Xanthomyrtus Klossii* (Ridl.) Diels var. *brevipedunculata* Diels**, Nov. Guin. **14**: 86, 1924; Lam, Nat. Tijdschr. Nederl.-Ind. **89**: 72, 87, 101, 132, 134, 135, 1929.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9074, August 1938, alt. 3225 m., prostrate on mossy or lichen-covered ground, also on open boggy grassland (flowers yellow; fruit black, fleshy); 6 km. northeast of Lake Habbema, *Brass* 10664, October 1938, alt. 3000 m., prostrate on an open peaty depression in forest.

The tips of the younger branchlets and sometimes the petioles are sparsely pilose. On the same specimen there are flowers with both 2- and 3-loculed ovaries.

***Xanthomyrtus exigua* sp. nov.**

Arbor parva 1.5–5 m. alta; ramis ultimis tenuiter ramulosis, ramulis numerosis + villosulis; foliis prima juventute albido-villosis cito glabris demum glabris, coriaceis, in sicco supra atrofusces vel olivaceis subtus brunnescentibus petiolatis, petiolo circiter 1 mm. longo $\pm$ villosulo, lamina $\pm$ deorsum reclinata ovata vel lanceolato-elliptica, 3–7 mm. longa, 2–4 mm. lata, basi rotundata apice obtusa margine non recurva supra leviter punctulata subtus glandulosa, costa supra leviter impressa subtus manifesta, nervis primariis atque venis inconspicuis; floribus parvis axillaribus terminalibusque breviter pedunculatis, pedunculo 1–2 mm. longo villosulo; bracteis linearibus obtusis calycis tubum paululo superantibus; calyce $\pm$ villosulo, tubo 1 mm. longo, lobis triangularibus acutiusculis vix 1 mm. longis basi totidem latis; petalis vix 2.5 mm. longis 1.5 mm. latis unguiculatis; staminibus $\pm$ 10, filamentis 1.5–2 mm. longis; ovario 2-loculari.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernard Camp, Idenburg River, *Brass* 12452 (TYPE), February 1939, alt. 2150 m., mossy forest, common as a substage tree in open forest and one of the chief components of low scrubs on an exposed summit (1.5–5 m. high; young leaves very pale pubescent; flowers yellow).

Among the *Xanthomyrtus* species described by Diels this seems to be close to *X. linnaeifolia*. The latter has pustulate branchlets, a character which, if present in *X. exigua*, is concealed by the pubescence of both younger and older branchlets. The pubescence on the leaves is more evanescent and may entirely disappear, leaving the leaf glabrous or in the intermediate stage conspersely pilose with a barbate apex. The leaf-margin is not at all recurved. The small pubescent flowers are inconspicuous but mostly single and axillary toward the upper part of the branchlets.

***Eugenia* Linnaeus**

We have found only one species of *Eugenia sensu strictu* in the collection. As yet, we are not quite sure of the status of *Jossinia* Comm. and whether or not it is separable from *Eugenia* Linn. When working on the Bornean material, we borrowed a number of specimens from the Kew Herbarium in

the hope of settling the question in our own minds, but much more ample material is needed to make the decision. Diels has pointed out that *Jossinia* is much more like the American *Eugenia* than either *Jambosa* or *Syzygium*, but unfortunately does not specify how they differ. There are, in the collections of New Guinean material available, only two species which belong to *Jossinia* in the strict sense of the term; these we are omitting for the present.

***Eugenia Brassii* sp. nov.**

Arbuscula 1.5–4 m. alta; ramulis teretibus cinerascentibus novellis compressis brunnescentibus; foliis chartaceis vel tenuiter coriaceis in sicco supra olivaceis subtus pallidioribus minutissime atro-glandulosis, oblongis vel subovatis vel oblongo-ellipticis, 4–12.5 cm. longis, 1.5–4(–6) cm. latis, basi obtusis vel rotundato-cuneatis apicem versus angustatis apice obtusiusculis margine vix recurvatis, costa supra plana vel leviter canaliculata subtus prominula, nervis primariis compluribus utrinque exigue manifestis irregularibus in venam intramarginalem 1.5–3 mm. a margine confluentibus; petiolo circiter 5 mm. longo; inflorescentiis racemoso-cymosis usque 5-floris axillaribus saepius fasciculatis, pedunculo brevissimo $\pm$ 3 mm. longo, rhachi usque 7 mm. longa, pedicellis $\pm$ 3 mm. longis; alabastris circiter 5 mm. longis, apice 3 mm. diametro, parte infera clavata vel anguste subcampanulata supera subglobosa; calycis lobis 4 rotundatis exterioribus 1.5–2 mm. longis quam interioribus paullo minoribus; petalis 4 late oblongis singulatim deciduis; staminibus numerosis $\pm$ 3 mm. longis, antheris vix 1 mm. longis oblongis; stylo circiter 4 mm. longo, stigmatate peltato; fructibus oblongis $\pm$ 1.5 cm. longis, 1 cm. diametro, apice vix umbilicatis, calycis lobis deciduis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7474, August 1936, occasional in rain-forest undergrowth (tree 3–4 m. high; fruit black, fleshy, solitary or paired in axils); Tarara, Wassi Kussa River, *Brass* 8429 (TYPE), December 1936, undergrowth in light rain-forest (weak near-tree 1.5–2 m. high; leaf-nerves obscure; flowers white).

In the fruit the cotyledons are grown so closely together as to appear as one. At first glance the flowering material might be taken for *Syzygium* Gaertn. On closer examination, however, a single inflorescence is never more than a short raceme. The stigmas are definitely peltate; in *Syzygium* they are punctiform.

***Acmena* De Candolle**

Acmena acuminatissima (Blume) Merr. & Perry, Jour. Arnold Arb. **19**: 12. 1938.
Myrtus acuminatissima Blume Bijdr. 1088. 1826.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh* 11142, November 1938, alt. 2400 m., common in primary forest (tree 31 m. high, 52 cm. diameter; bark black, scaly; young fruit rose).

The brittleness and the general aspect of this collection is very similar to that of some Philippine collections of *Acmena acuminatissima* (Bl.) Merr. & Perry. This material seems to have no characters by which we might separate it from this species ranging from China to the Solomon Islands.

Acmena polyantha (Lauterb. & K. Schum.) Merr. & Perry, Jour. Arnold Arb. **19**: 11. 1938.

Xenodendron polyanthum Lauterb. & K. Schum. in K. Schum. & Lauterb, Fl. Deutsch. Schutzgeb. Südsee 461, t. 16. 1900; Diels, Bot. Jahrb. **57**: 415. 1922.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 7977, rain-forest, common on ridges (substage tree; flowers white, produced in great abundance). NORTHEASTERN NEW GUINEA: Sattelberg, *Clemens* 1086, 1750, alt. 900 m.

The leaves in the Fly River collection are a little larger than those of plants from the higher altitudes, and some of them are less acuminate, but this is probably only a variation within the species.

Acmena laevifolia (Ridl.) Merr. & Perry, Jour. Arnold Arb. **19**: 18, 1938, vel aff.
Eugenia laevifolia Ridl. Trans. Linn. Soc. Bot. II. **9**: 48, 1916.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh* 11131, November 1938, alt. 2400 m., rare in primary forest (tree 20 m. high, 43 cm. diameter; bark fairly smooth, black; flowers white).

This collection differs from Ridley's description chiefly in having smaller leaves (about 7 cm. long and 2.5 cm. wide) with rounded-cuneate base. Possibly it is a distinct species, but the specific lines in the genus are difficult to define, hence it seems best to wait for more material to accumulate.

Acmena hemilampra (F. v. Muell. ex F. M. Bail.) Merr. & Perry, Jour. Arnold Arb. **19**: 15, 1938.

Eugenia hemilampra F. v. Muell. ex F. M. Bail. Synop. Queensl. Fl. Suppl. **1**: 23, 1886.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7766, September 1936, rain-forest (canopy-tree attaining 30 m.; soft suberose scaly brown bark; flowers white), 7941, common in light fringing rain-forests (tree 14-15 m. high; flowers white); Gaima, Lower Fly River, *Brass* 8283, common in rain-forests (profusely flowering canopy-tree; bark brown, thick, hard, deeply fissured, red when cut; flowers and fruit white).

These collections scarcely differ from the Australian material of this species except that the leaves are obtuse, hardly any of them showing the obtuse acumination found in most (but not all) Australian collections; the new branchlets are sulcate but quickly become terete.

***Syzygium* Gaertner**

Although the material here considered under *Syzygium* Gaertn. is highly diverse, we have found no basis for changing the concept of the genus as presented in our study of the Bornean species of *Syzygium*. The other genera we have accepted conventionally. *Syzygium* is the largest one represented in New Guinea, and, knowing the general practices, on the one hand to divide the material into *Jambosa* DC. and *Syzygium* Gaertn., and on the other to mass all under *Eugenia* Linn., we have again reconsidered our position. It had been suggested to us that the fruits of *Jambosa* DC. are soft and fleshy, whereas those of *Syzygium* Gaertn. are hard even when ripe. We have tried to break our collection on that basis, only to find a collection from the Solomon Islands with flowers of *Jambosa* but with the pericarp of the dried fruit so full of fibres that we had to cut it with a saw in order to examine the structure of the seed. Many fleshy fruits are crowned by very short calyx-lobes and very narrow staminal disks. Furthermore, in a half grown condition it would not be easy to distinguish fleshy from firm fruits without some supporting characters. We have not space to enumerate all the interesting variations we have seen for the first

time in this material, but in spite of these we have failed to locate any really fundamental differences which might form the basis of generic distinction for *Jambosa* and *Syzygium*. We have found only two Malaysian species in the collection.

In order to make our list of names reasonably complete for reference, we merely note that in addition to the species represented or mentioned in comments in our paper, we have no additional material of ***Syzygium hylochare*** (Diels) comb. nov. (*Jambosa hylocharis* Diels, Jour. Arnold Arb. **10**: 83. 1929); ***Syzygium najadum*** (Diels) comb. nov. (*Jambosa najadum* Diels, op. cit. 82); ***Syzygium Sargentianum*** (Diels) comb. nov. (*Jambosa Sargentiana* Diels op. cit. 83); ***Syzygium lagynocalyx*** (Diels) comb. nov. (*Jambosa lagynocalyx* Diels, Bot. Jahrb. **57**: 394. 1922); ***Syzygium trachyanthum*** (Diels) comb. nov. (*Jambosa trachyantha* Diels, op. cit. 394). We have small photographs of ***Syzygium garcinioides*** (Ridl.) comb. nov. (*Eugenia garcinioides* Ridl. Trans. Linn. Soc. Bot. II. **9**: 44. 1916); ***Syzygium monetarium*** (Ridl.) comb. nov. (*Eugenia monetaria* Ridl. op. cit. 49); ***Syzygium subalatum*** (Ridl.) comb. nov. (*Eugenia subalata* Ridl. op. cit. 44); ***Syzygium Vandewateri*** (Ridl.) comb. nov. (*Eugenia Vandewateri* Ridl. op. cit. 45); ***Syzygium Wollastonii*** (Ridl.) comb. nov. (*Eugenia Wollastonii* Ridl. op. cit. 47). The following species are not mentioned elsewhere in the article, nor are they represented in our herbarium: ***Syzygium cladopterum*** (Diels) comb. nov. (*Jambosa cladoptera* Diels, Bot. Jahrb. **57**: 391. 1922); ***Syzygium decoriflorum*** (Diels) comb. nov. (*Jambosa decoriflora* Diels op. cit. 396); ***Syzygium pachyanthum*** (Diels) comb. nov. (*Jambosa pachyantha* Diels, op. cit. 395); ***Syzygium phacelanthum*** (Diels) comb. nov. (*Jambosa phacelantha* Diels, op. cit. 390); ***Syzygium polyphlebium*** (Diels) comb. nov. (*Jambosa polyphlebia* Diels, op. cit. 391); ***Syzygium riparium*** (Diels) comb. nov. (*Jambosa riparia* Diels, op. cit. 389); ***Syzygium verniciflorum*** (Diels) comb. nov. (*Jambosa verniciflora* Diels, op. cit. 387); ***Syzygium xylopiaceum*** (Diels) comb. nov. (*Jambosa xylopiacea* Diels, op. cit. 392); ***Syzygium acoranthum*** (Diels) comb. nov. (*Jambosa acorantha* Diels, Nov. Guin. **14**: 90. 1924); ***Syzygium Bruynii*** (Diels) comb. nov. (*Jambosa Bruynii* Diels, op. cit. 92); ***Syzygium Thomseni*** (Diels) comb. nov. (*Jambosa Thomseni* Diels, op. cit. 91); ***Syzygium Rechingeri*** nom. nov. (*Jambosa micrantha* Rech. Rep. Sp. Nov. **11**: 183. 1912, non *S. micranthum* Bl.); ***Syzygium sabangense*** (Lauterb.) comb. nov. (*Jambosa sabangensis* Lauterb. Nov. Guin. **8**: 320. 1910); ***Syzygium dolichophyllum*** (Lauterb. & K. Schum.) comb. nov. (*Jambosa dolichophylla* Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 471. 1900); ***Syzygium synaptoneurum*** (Lauterb. & K. Schum.) comb. nov. (*Jambosa synaptoneura* Lauterb. & K. Schum. in K. Schum. & Lauterb. op. cit. 475); ***Syzygium bibracteatum*** (Greves) comb. nov. (*Eugenia bibracteata* Greves, Jour. Bot. **61**: suppl. 18. 1923); ***Syzygium diplomarginatum*** (Greves) comb. nov. (*Eugenia diplomarginata* Greves, op. cit. 15); ***Syzygium merokense***

(Greves) comb. nov. (*Eugenia merokensis* Greves, op. cit. 16); **Syzygium niviferum** (Greves) comb. nov. (*Eugenia nivifera* Greves, op. cit. 19); **Syzygium pergamaceum** (Greves) comb. nov. (*Eugenia pergamacea* Greves, op. cit. 16); **Syzygium porphyrocarpum** (Greves) comb. nov. (*Eugenia porphyrocarpa* Greves, op. cit. 17); **Syzygium salpinganthum** (Greves) comb. nov. (*Eugenia salpingantha* Greves, op. cit. 19); **Syzygium sogerense** (Greves) comb. nov. (*Eugenia sogerensis* Greves, op. cit. 18); **Syzygium trichotomum** (Greves) comb. nov. (*Eugenia trichotoma* Greves, op. cit. 19); **Syzygium Warburgii** nom. nov. (*Eugenia glomerata* Warb. Bot. Jahrb. **13**: 390. 1891, non Lam. 1791); **Syzygium Bartonii** (F. M. Bail.) comb. nov. (*Eugenia Bartonii* F. M. Bail. Proc. Roy. Soc. Queensl. **18**: 2. 1903); **Syzygium LeHuntei** (F. M. Bail.) comb. nov. (*Eugenia LeHuntei* F. M. Bail. Queensl. Agric. Jour. **9**: 411. 1901). The last species may possibly be an *Acmena* but very few *Acmena* species have the leaves copiously glandular. We cannot be sure whether the two species, *Eugenia koikokoensis* Greves and *E. racemoides* Greves, belong to *Eugenia* or to *Syzygium*, nor are we willing to pass upon *Eugenia coalita* Greves without first examining the type. We suspect, however, that it is a *Syzygium*. *Syzygium ellipticum* Lauterb. & K. Schum. Fl. Deutsch. Schutzg. Südsee 476. 1900, type from New Guinea, which Diels, Bot. Jahrb. **57**: 367. 1922, indicates is a *Psidium*, is, from the description, nothing but the common pan-tropic guava, *Psidium guajava* Linn., and should be placed with the synonymy of the latter.

We have so many species represented that it has seemed to us they might be more easily located if they were broken up into a few groups by some superficial characters; hence, a very brief key is interspersed between groups of species which have some one character in common; we have not tried to group them together in any natural system; much more material would have to be examined before that could be done with any degree of confidence.

A. Bracts of the inflorescence subcoriaceous, apparently persistent.

Syzygium anomalum Lauterb. Nov. Guin. **8**: 853. 1912; Diels, Bot. Jahrb. **57**: 405. 1922.

NETHERLANDS NEW GUINEA: Hollandia, *Brass 9001*, July 1938, alt. 100 m., occasional in rain-forest substage (flowers small white; fruit red, about 8–10 mm. diameter); *Neth. Ind. For. Service bb.25052*, July 1938, alt. 50 m.

These collections are from the type-locality, but it seems worth while to record the color and size of the fruit as found in the field notes.

Syzygium bracteosum sp. nov.

Arbor usque 29 m. alta; ramis atro-cinereis; ramulis teretibus vel subcompressis brunnescentibus; foliis valde coriaceis in sicco brunneis vel olivaceo-viridibus supra consperse punctatis subtus manifeste reticulatis, ellipticis vel obovato-ellipticis, 4–10 cm. longis, 2.5–5.5 cm. latis, basi acutis vel cuneatis, apice obtuse acuminato recurvato, margine recurvatis, costa supra impressa subtus elevata, nervis primariis utrinsecus ± 10 supra indistinctis vel leviter aciculatis subtus prominulis subirregulariter dispositis 7–9 arcubus intramarginalibus a margine 3–4 mm. remotis conjunctis; petiolo 6–9 mm. longo supra canaliculato; inflorescentiis ter-

minalibus subcorymbosis $\pm$ 4 cm. longis 6 cm. latis compacte multifloris, a basi ramosis bracteolatis, bracteolis persistentibus concavis subrotundatis circiter 2 mm. longis, alabastris immaturis obconicis 5 mm. longis 4 mm. diametro, calycis lobis exterioribus 1.5 mm. longis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh 11117*, November 1938, alt. 2300 m., rare tree of primary forest (24 cm. high, 31 cm. diameter; bark 5 mm. thick, white, scaly; flower buds red); 15 km. northeast of Lake Habbema, *Brass & Versteegh 11986* (TYPE), January 1939, alt. 1800 m., rare in primary forest (tree 29 m. high, 107 cm. diameter; bark 11 mm. thick, black-brown, scaly; flower-buds rose).

These collections, though not exactly in the same stage of development, appear to represent a single species perhaps allied to *Syzygium dictyoneurum* Diels or *S. Caroli* Diels, both of which are described as having chartaceous leaves. The collections here cited have strongly coriaceous leaves fairly smooth above but with obvious primary nerves and reticulations on the lower surface.

***Syzygium pallens* sp. nov.**

Arbor gracilis 4 m. alta; ramis teretibus; ramulis compressis fulvescentibus; foliis chartaceis in sicco supra olivaceo-viridibus subtus pallidioribus consperse minute atro-glandulosis oblongo-lanceolatis, 4.5–12.5 cm. longis, 1.4–3.5 cm. latis, utrinque angustatis basi acutis paullo decurrentibus, apice acuminatis, acumine $\pm$ 1 cm. longo, costa supra impressa subtus prominula, nervis primariis numerosis oblique patentibus interdum fere subobscuris; petiolo $\pm$ 1 cm. longo tenui supra canaliculato; paniculis terminalibus 1.5–2 cm. longis paucifloris (usque 12), rhachi atque ramis saepe rimulosis, ramis apice bibracteatis, bracteis concavis ovatis obtusis 1–1.5 mm. longis subpersistentibus; floribus parvis sessilibus plerumque apice ramorum solitariis; calycis tubo campanulato 2–3 mm. longo latoque, lobis 4 circiter 1 mm. longis; staminibus 3–4 mm. longis, filamentis basi annulato-connatis; fructibus non visis.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass 3936* (TYPE), May 1933, alt. 500 m., rain-forest (very slender tree 4 m. tall; dark smooth flat leaves, paler beneath; calyx red, petals and stamens white).

The species approaches the description of *Syzygium gyrostemoneum* Diels. Without authentic material for comparison we cannot say whether the two are identical or not. It is to be noted, however, that the collection before us is smaller in both foliage and flowers, the leaves are not cuspidate, and the venation is less obvious than that described by Diels.

***Syzygium papuasicum* sp. nov.**

Arbor usque 30 m. alta; ramis teretibus cortice rimosis; ramulis teretibus novellis sulcatis brunnescentibus; foliis chartaceis vel tenuiter coriaceis minute pellucido-punctatis in sicco supra nitidis atro-olivaceis subtus leviter pallidioribus minute atro-glandulosis, oblongo-ellipticis, 18–20 cm. longis, 6.5–8.5 cm. latis, utrinque sensim angustatis basi cuneatis vel subobtusis apice abrupte acuminatis, acumine $\pm$ 1 cm. longo obtusiusculo, costa supra canaliculata subtus prominente, nervis primariis utrinsecus $\pm$ 15 oblique adscendentibus in venam intramarginalem 2–3 mm. a margine arcuatim confluentibus supra leviter insculptis subtus prominulis, reticulo laxo inconspicuo; petiolo $\pm$ 1.5 cm. longo; inflorescentiis e nodis defoliatis

ortis 10–20 cm. longis latisque, ramis valde divaricatis, rhachi ramis ramulisque subteretibus vel leviter compressis, bracteis parvis subpersistentibus; floribus basi bibracteatis sessilibus triadibus apice ramulorum, alabastris pyriformibus basi angustatis 4 mm. longis, 3 mm. diametro; calycis tubo 3 mm. longo latoque margine minute 4-lobato, sub lobis paullo constricto; staminibus circiter 5 mm. longis; fructibus non visis.

NETHERLANDS NEW GUINEA: Otakwa, *Neth. Ind. For. Service* bb.22092, January 1937. SOLOMON ISLANDS: Bougainville: Kieta, *Kajewski* 1544 (TYPE), March 1930, sea-level, common in rain-forest (large tree up to 30 m. high; calyx pink, stamens white, very showy).

This species is very much like the description of *Syzygium acutangulum* (K. Schum.) Niedenzu, except that the latter has very sharply 4-angled branchlets in both the vegetative and the reproductive parts of the plant.

Syzygium torricellianum Diels, Bot. Jahrb. **57**: 405. 1922.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 11934, January 1939, alt. 1740 m., occasional in primary forest (tree 32 m. high, 38 cm. diameter; bark reddish brown; flowers rose).

This collection fits the original description of *Syzygium torricellianum* Diels. Known previously only from the type-collection.

A. Bracts of the inflorescence various, mostly deciduous.

B. Inflorescence mostly reduced to solitary flowers (also cymose in S. saliciforme).

Syzygium callianthum sp. nov.

Arbor parva usque 6 m. alta; ramis cinereo-fuscescentibus; ramulis tetragonis brunnescentibus; foliis tenuiter coriaceis vix pellucido-punctatis subtus consperse minuteque glandulosis inconspicue reticulatis supra olivaceis vel brunnescentibus subtus pallidioribus fulvo-brunnescentibus oblongis vel anguste ellipticis, 8–15 cm. longis, 2.5–6 cm. latis, basi cuneatis vel obtusis apice subabrupte acuminatis, acumine 1–1.5 cm. longo 2 mm. lato obtuso, margine leviter recurvatis, costa supra canaliculata subtus elevata, venis primariis utrinsecus 13–20 supra insculptis subtus perspicuis subtransversis in venam intramarginalem perspicuam 2 mm. a margine distantem confluentibus; petiolo 2–5 mm. longo atrofusco; pedunculo vix 4 mm. longo, pedicello 7–11 mm. longo; floribus magnis terminalibus solitariis creberrime minuteque glandulosis; calycis tubo toto obtuso obconico-turbinato, 2.5–3 mm. longo: basi 5–8 mm. lato, dein 0.7–1 cm. longo, gradatim ampliato 1–1.5 cm. lato, supra valde aucto 4 cm. lato, lobis 4 rotundatis exterioribus $\pm$ 1 cm. longis, interioribus $\pm$ 1.5 cm. longis; petalis 2.5 cm. longis 3 cm. latis, breviter unguiculatis; staminibus $\pm$ 3 cm. longis, antheris 2 mm. longis; disco stamineo 4–5 mm. lato; fructibus ignotis.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass* 4146 (TYPE), May 1933, common small substage tree in foot-hill forest (sparsely foliated and slender, up to 6 m. tall; leaves yellowish beneath; very showy flowers about 8 cm. diameter when fully open; sepals outside green tipped with red, inside red; petals red; filaments pink, anthers whitish).

This is a well marked species with tetragonous branchlets, leaf-venation strongly impressed above and prominent beneath, and very showy flowers. The flowers are about the size of those of ***Syzygium eximiflorum*** (Diels)

comb. nov. (*Jambosa eximiiiflora* Diels, Nov. Guin. 14: 92. 1924), but they are not stipitate at the base, the leaves are not emarginate at the base, and the acumen is only about half as long as in the related species. Amongst the Malaysian material, this species shows some resemblance to *Eugenia johorensis* Ridl., but there are differences in both the branchlet- and the leaf-characters.

Syzygium Keysseri (Schlechter) comb. nov.

Jambosa Keysseri Schlechter in Diels, Bot. Jahrb. 62: 485. 1929.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, Brass 11392, November 1938, alt. 2200 m., occasional in secondary forest (tree 3–5 m. high; flowers red with green stamens).

The type was collected on Mt. Sarawaket at 3000 m. altitude. The material here cited differs from the original description only in the size of the leaves (3–6 cm. long, 1.5–3 cm. broad), the diameter of the calyx-tube, and the size of the petals. This is probably owing to the two plants being in different stages of development. We should like to add that some of the leaves are obtuse at the apex and all are shallowly cordate at the base. The flower, including the filaments and the connective of the anther sacs, is copiously glandular.

Syzygium macrocalyx sp. nov.

Arbor vel frutex; ramulis teretibus vel leviter compressis; foliis coriaceis obscure reticulatis in sicco supra atro-brunnescentibus minute punctulatis subtus pallidioribus, ellipticis interdum paullo obliquis, 8.5–16 cm. longis, 3.5–7 cm. latis, basi cuneatis apice verisimiliter acuminatis (apice summo fracto) margine leviter revolutis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus 11–17 oblique patentibus in venam intramarginalem $\pm$ 3 mm. a margine distantem confluentibus supra manifestis subtus prominulis; petiolo $\pm$ 5 mm. longo; pedunculo 5 mm. longo cras-soque; flore singulo terminali post anthesim obconico-campanulato, calycis tubo 3.5 cm. longo (incl. partem supra ovarium vix 1 cm. productam) basi 1 cm. apice 2.5–2.7 cm. lato, crasse longitudinaliter rugoso, lobis 5–9 mm. longis $\pm$ 1 cm. latis, disco stamineo 3 mm. lato.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, Clemens 3078 (TYPE), April 1936, alt. $\pm$ 1000 m.

We are unable to suggest the alliance of this species. The flower approaches that of **Syzygium Grevesianum** nom. nov. (*Eugenia pterocalyx* Greves, Jour. Bot. 61: Suppl. 17. 1923) but the calyx-tube is not winged, though coarsely rugose, and the leaves are shorter and broader. The specific name *pterocalyx* has already been used in *Syzygium*.

Syzygium saliciforme sp. nov.

Arbor 3–4 m. alta; ramulis tenuibus sulcatis; foliis $\pm$ confertis impel-lucidis chartaceis utrinque opacis supra olivaceis subtus leviter pallidioribus, lanceolatis, 6–14 cm. longis, 1–2 cm. latis, basi cuneatis vel acutis apice longe acuminatis, costa supra canaliculata subtus prominula, nervis primariis utrinsecus $\pm$ 16 subpatentibus in venam intramarginalem $\pm$ 2 mm. a margine confluentibus, reticulo obscuro; petiolo 2–5 mm. longo; cymis axillaribus 3–1-floris, 2.5–4 cm. longis, pedunculo 0.5–2 cm. longo; calycis tubo infero stipitato supero pyriformi 8 mm. longo includente

stipitem 3 mm. longum, lobis 4 circiter 1.5 mm. longis triangularibus obtusiusculis; petalis singillatim deciduis; staminibus $\pm$ 1 cm. longis; fructibus stipitato-subglobosis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7243 (TYPE), July 1936, alt. 100 m., restricted to inundation banks of river (tree 3–4 m. high, with layered drooping branches; flowers pink; fruit soft, white, up to 2.8 cm. diameter).

On account of the two collections, *Brass* 7243 and 7244, which we have at hand, we are inclined to believe that this, rather than *Syzygium salicinum* (Ridl.) Merr. & Perry, is the species represented by *Jambosa salicina* Diels. This closely fits Diels's description and he does not mention the calyx-lobes; these are small enough to be overlooked in this species, but surely not in the other. However, the name is already pre-empted by Ridley's earlier use. Since we have not access to the original material, we have described the species as new. The matter cannot be settled definitely without a comparison with authentic material. The species also seems to be somewhere in the neighborhood of ***Syzygium Daphne*** (Ridl.) comb. nov. (*Eugenia Daphne* Ridl. Trans. Linn. Soc. Bot. II. 9: 45. 1916), but the leaves are not rounded at the base, the apex is distinctly long acuminate, and the pedicels are erect.

Syzygium salicinum (Ridl.) comb. nov.

Eugenia salicina Ridl. Trans. Linn. Soc. Bot. II. 9: 45. 1916.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7244, July 1936, alt. 100 m., restricted to river inundation banks (tough low tree 2–3 m. high, with horizontal wide spreading branches; leaves very dark green; large solitary white flowers).

As nearly as we can judge from the photograph and the description of this species, *Brass* 7244 belongs here. Diels, Bot. Jahrb. 57: 390. 1922, described a *Jambosa salicina* which he later accepted as Ridley's species, Nov. Guin. 14: 91. 1924, the latter having been overlooked at the time of his earlier publication. We do not know whether he had seen the original of Ridley's species or not, but his description seems to us to suit better the material which we have described as *Syzygium saliciforme*. Since we are not sure of this without an opportunity to examine the original material, we are not placing *Jambosa salicina* Diels in our synonymy.

Syzygium soliflorum (Diels) comb. nov.

Jambosa soliflora Diels, Bot. Jahrb. 57: 393. 1922.

NORTHEASTERN NEW GUINEA: Yunzaing, *Clemens* 2954, 6436, March 1936, June 1937, alt. $\pm$ 1350 m.

These collections fit Diels's description of this species very closely. In addition to the above we tentatively place here (noting differences) a collection from BRITISH NEW GUINEA: Mount Tafa, *Brass* 4910, August 1933, alt. 2400 m., valley forests (slender small tree with brown somewhat flaky bark and hard brown wood; dark smooth leaves pale beneath; solitary reddish flowers). The leaves are a little smaller, 2.5–6 cm. long, 1–2.5 cm. broad, the acumen is a little shorter and broader than in the collections from Northeastern New Guinea, in the dried specimens the lower surface

of the leaves is pale brownish rather than brownish green, and the primary veins are a little less conspicuous. There is scarcely any difference in the flowers except that *Brass 4910* is copiously reddish gland-dotted whereas the Clemens collections are profusely supplied with yellowish or brownish glands. This may be owing to a different mode of drying. Both have sharply 4-angled branchlets on the new growth and greyish bark on the older branchlets.

The leaves are too small to place the specimens in *Syzygium tricolor* (Diels) comb. nov. (*Jambosa tricolor* Diels Bot. Jahrb. 57: 393. 1922). On the other hand it is to be noted that the flower in these collections represents a reduced cyme as indicated in the description of *Syzygium tricolor*, since it is supported on a jointed peduncle and pedicel; however, the peduncle in this particular collection is very short.

Syzygium tympananthum (Diels) comb. nov.

Jambosa tympanantha Diels, Bot. Jahrb. 57: 393. 1922.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 12573*, February 1939, alt. 1300 m., rare in primary forest on slope of ridge (tree 23 m. high, 41 cm. diameter; bark red-brown; ripe fruit red); 4 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13159*, March 1939, alt. 800 m., common in secondary rain-forest on plain (tree 26 m. high, 42 cm. diameter; bark grey; fruit red). NORTHEASTERN NEW GUINEA: Yunzaing, *Clemens 3976*, 4077, August, September 1936, alt. 1350–1500 m.; Sattelberg, *Clemens 1071*, December 1935, alt. 1000–1200 m.

This species has a very distinctive fruit.

Syzygium uniflorum sp. nov.

Arbor parva 4–5 m. alta; ramis cinereis; ramulis brunnescentibus compressis; foliis tenuiter coriaceis novellis creberrime pellucido-punctatis supra olivaceis minute punctatis subtus pallidioribus creberrime minuteque glandulosis oblongis vel anguste lanceolatis, 4–8 cm. longis, 1–2.3 cm. latis, basi elongato-cuneatis apice caudato-rostratis, cauda $\pm$ 1.5 cm. longa obtusa, costa supra canaliculata subtus prominula, nervis numerosis tenuibus oblique patentibus supra subobscuris subtus manifestis vix prominulis; petiolo circiter 2 mm. longo; floribus axillaribus solitariis, pedunculo 3–6 mm. longo, pedicello $\pm$ 5 mm. longo; calycis tubo 7–10 mm. longo stipitato-turbinato crebre glanduloso hinc inde verruculoso, lobis 4 circiter 2 mm. longis 4 mm. latis exterioribus paullo minoribus; petalis singillatim caducis $\pm$ 4 mm. longis subrotundatis glandulosis; staminibus 5 mm. vel ultra longis, filamentis glandulosis, antheris oblongis 1 mm. longis; stylo $\pm$ 1.5 cm. longo; fructibus immaturis stipitato-subglobosis subverruculosis.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass 5608* (TYPE), December 1933, alt. 100 m., river bed gravel banks (small tree 4–5 m. tall; flowers white; immature fruits rugose).

In the small leaves and the solitary flowers *Syzygium uniflorum* suggests *Syzygium Pilgerianum* (Lauterb. & K. Schum.) comb. nov. (*Jambosa Pilgeriana* Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzg. Südsee 473. 1900), but it differs from the latter in the compressed rather than quadrangular branchlets, the inconspicuous venation of the leaves, and the somewhat verruculose flowers and fruits.

***Syzygium vaccinioides* sp. nov.**

Arbor parva vel frutex; ramis $\pm$ cinereis cortice desquamato; ramulis crebris brunnescentibus conspicue crispuleque 4-alatis saepe crebre glandulosis; foliis chartaceis pellucido-punctatis supra olivaceis subtus pallidioribus glanduloso-pustulatis ellipticis vel obovatis, 5–8 mm. longis, 3–5 mm. latis (semper quam latis longioribus), basi cuneatis apice obtusis, costa supra inconspicua subtus vix prominula, nervis primariis vix manifestis; petiolo 1 mm. longo; floribus solitariis axillaribus nitidis basi bibracteatis, bracteis circiter 3 mm. longis oblongis basi angustatis foliiformibus, pedunculo $\pm$ 2.5 mm. longo alato; calycis tubo circiter 2.5 mm. longo obconico-campanulato supra dilatatum subquadrangularem, lobis 4 circiter 1 mm. longis rotundatis; petalis vix 1 mm. longis singillatim caducis; staminibus 9–11, filamentis $\pm$ 0.5 mm. longis, antheris 0.4 mm. longis subrotundatis; fructibus usque 6 mm. diametro.

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass* 4515 (TYPE), July 1933, alt. 2840 m., forest borders (densely foliated small tree or bush of erect branching habit; aromatic; leaves concave, shining, paler and punctate beneath; solitary greenish white flowers; fleshy red fruit up to 6 mm. diameter).

This plant is very closely related to *Syzygium alatum* (Lauterb.) Diels. It differs in the elliptic or obovate leaves (always longer than broad), the crisped wings of the branchlets, and the slightly larger flower with obtuse calyx-lobes. The two fruits available for examination do not have seeds, but, as far as we can see at present, there is no reason not to accept the species as *Syzygium*.

***Syzygium Versteegii* (Lauterb.) comb. nov.**

Jambosa Versteegii Lauterb. Nov. Guin. **8**: 321. 1910, l. c. 850. 1912; Diels, Bot. Jahrb. **57**: 391. 1922, Jour. Arnold Arb. **10**: 83. 1929; White, l. c. 252.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12562, February 1939, alt. 1200 m., occasional in primary forest (tree $\pm$ 20 m. high, 40 cm. diameter; bark gray, scaly; fruit red). BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7694, rain forest substage tree growing close to water (10 m. high; leaves pale beneath; flowers large, glaring pink; fruit roughly oblong, $\pm$ 9 $\times$ 6 cm., found rotting on the ground); Lower Fly River, east bank opposite Sturt Island, *Brass* 8019, October 1936, rain-forest substage tree, occasional on flood-plains and low ridges (6–8 m. high, flowers pink).

In *Brass & Versteegh* 12562 the primary veins are a little closer together than in the other numbers and possibly the petioles are slightly longer, but it seems to belong to this species.

B. Inflorescence various, flowers few or many, usually not solitary.

C. Flowers large, calyx-tube 8 mm. or more in diameter immediately below the calyx-lobes.

D. Inflorescence usually below the leaves at defoliated nodes or on the trunk.

***Syzygium gonatanthum* (Diels) comb. nov.**

Jambosa gonatantha Diels, Bot. Jahrb. **57**: 384. 1922.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh* 14106, May 1939, alt. 75 m., in primary rain-forest on lower mountain slopes (tree 21 m. high, 43 cm. diameter; bark dark brown, scaly; flowers red).

As far as we can judge from Diels's very sketchy description, this collec-

tion may belong here. The leaves are a little smaller ($6.5-17 \times 2-6$ cm.) than in the type, the primary nerves are arcuate, barely, if at all, forming an intramarginal vein, and the petioles 1.5 cm. long. The secondary venation is obscure. The fully mature flowers are red rather than white; calyx-tube 1.2–1.5 cm. long, turbinate-obconic, about 1 cm. wide at the apex, at the base 2–2.5 mm.; inner calyx-lobes 5 mm. long, 7 mm. broad, petals ± 1 cm. long; stamens about 2 cm. long.

***Syzygium heterobotrys* sp. nov.**

Arbor 12 m. alta; ramulis teretibus brunnescentibus; foliis chartaceis impellucidis, in sicco supra atro-brunnescentibus subtus pallidioribus inconspicue reticulatis, ellipticis vel oblongo-ellipticis vel leviter obovato-ellipticis, 14–27 cm. longis, 4–10 cm. latis, interdum leviter obliquis utrinque fere aequaliter angustatis basi cuneatis apice breviter acuminatis, acumine ± 1 cm. longo basi ± 7 mm. lato obtusiusculo, costa supra canaliculata subtus elevata, nervis primariis utrinsecus 9–13 oblique adscendentibus 7–10 mm. a margine elongato-subarcuatis confluentibus supra manifestis subtus prominulis, vena submarginali secundaria ± 4 mm. a margine disposita; petiolo 1.5–2 cm. longo bicolore parte inferiore atrofusco crassiusculo subtereti, superiore pallidior canaliculato; inflorescentiis caulifloris vel etiam in ramulis foliatis terminaliter dispositis, usque 13 cm. longis; pedunculo 2–8 cm. longo; floribus sessilibus in apice ramorum brevium (± 1.5 cm. longorum) vel plerumque in nodis 2–3 dispositis 5–7-verticillatis vel subverticillatis, nodis inter se 0.5–2.5 cm. remotis; calycis tubo basi 4–7 mm. stipitato sursum ± 1.2 cm. turbinato minute puberulo striato-ruguloso, lobis 4 circiter 3 mm. longis rotundatis; petalis 4 singillatim caducis; staminibus 1.5–2 cm. longis; fructibus ignotis.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8238 (TYPE), November 1936, rain-forest substage (profusely flowering cauliflorous tree 12 m. high; flowers also terminal on leafy branchlets; petals green; stamens yellow).

A very distinct species for which we cannot suggest any apparently close relative. The sparsely (if at all) branched inflorescences with the flowers in verticillate or subverticillate whorls at two or three nodes (terminal and below), the long-stipitate turbinate puberulent flowers, and the rather distinct primary veins, which are elongate-arcuate and confluent, forming an irregular intramarginal vein well within the margin of the leaf, are characters which make this species easily recognized.

***Syzygium laqueatum* sp. nov.**

Arbor 20 m. alta; ramis cortice cinereis; ramulis compressis vel obtuse subangulatis brunnescentibus; foliis impellucidis in sicco olivaceis utrinque manifeste reticulatis, ellipticis, 10–18 cm. longis, 5–10 cm. latis, basi subrotundatis apice (totis laesis) obtusiusculis (?), margine anguste recurvatis, costa supra plana vel basim versus leviter canaliculata subtus prominente, nervis primariis 6–9 patenti-adscendentibus marginem versus crebre anastomosantibus supra leviter elevatis subtus prominulis; petiolo 1.5 cm. longo; inflorescentiis e nodis defoliatis ortis, 4–9 cm. longis a basi ramosis, ramulis subangulatis; floribus pedicellatis vel sessilibus apice ramulorum articulatorum; calycis tubo elongato-obconico vel -turbinato, basi stipitato 1.3–1.5 cm. longo, lobis 4 late rotundatis exterioribus 3 mm. interioribus 5

mm. longis; petalis rotundatis 1 cm. longis; staminibus 1.5 cm. longis; fructibus immaturis.

NETHERLANDS NEW GUINEA: 18 km. northeast of Lake Habbema, *Brass & Versteegh 11157* (TYPE), November 1938, alt. 2350 m., rare in primary forest (tree 20 m. high, 43 cm. diameter; bark brown, scaly; flowers white; young fruit soft green).

This species shows some resemblance to *Syzygium pachycladum* (Lauterb. & K. Schum.) comb. nov. (*Jambosa pachyclada* Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 474. 1900), but it has smaller leaves with conspicuous venation; there is no definite intramarginal vein, but the primaries are variously connected by anastomoses in a region just within the margin. The bracts of the inflorescence have already fallen.

The following two fruiting collections appear to be closely allied; we are not sure that they are conspecific: NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13508*, March 1939, alt. 700 m., occasional on slopes of primary forest (tree 37 m. high, 86 cm. diameter; bark brown, scaly; fruit below the leaves, pyriform, 5 cm. long, 3 cm. diameter); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13106*, March 1939, alt. 1170 m., occasional in primary forest (tree 31 m. high, 48 cm. diameter; bark grey, scaly; fruit on old growth, obliquely pyriform, dark red, 4 cm. long, 3.5 cm. diameter). In this complex also belongs *Brass & Versteegh 11956*, a sterile collection.

Syzygium Leonhardi (Diels) comb. nov.

Jambosa Leonhardi Diels, Bot. Jahrb. **57**: 384. 1922.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 7323*, July 1936, alt. 100 m., peculiar to flood-plain forest (tree attaining 10 m.; foliage damaged by leaf-cutting insects; leaf-nerves impressed above, prominent below; fruit scattered along the stem, solitary, almost sessile, turgid, red, to ± 7 cm. diameter).

This collection has too many characters in common with the brief original description of the species to place it elsewhere without an actual examination of the type. It is to be noted, however, that the secondary venation of the leaves is manifest though not at all conspicuous.

Syzygium thalassicum sp. nov.

Arbor parva vel frutex altus; ramulis acute tetragonis anguste alatis rubro-brunnescentibus; foliis sessilibus coriaceis in sicco supra brunnescentibus subtus fulvo-brunnescentibus minute glandulosis inconspicue reticulatis oblongo-lanceolatis, 19–21.5 cm. longis, 7.5–8.5 cm. latis, basi cordatis apice obtuse acutis margine leviter recurvatis, costa supra impressa subtus elevata, nervis primariis utrinsecus ± 13 late patentibus in venam intramarginalem crenatam ± 5 mm. a margine distantem confluentibus, vena submarginali secundaria cum primaria subparallela 1–2 mm. a margine disposita; inflorescentiis completis non visis; floribus post anthesim pyriformibus minute glandulosis; calycis tubo circiter 2 cm. longo (incl. supra ovarium 4–5 mm. producto), apice 1 cm. lato; lobis 4 rotundatis, exterioribus ± 2 mm. longis, interioribus 5 mm. longis, 7 mm. latis; staminibus fractis; fructibus 3.5–4 cm. longis, ± 1.7 cm. diametro, minute glandulosis subleviter longitudinaliter rugosis pyriformibus vel

ellipticis basi stipitatis, stipite 6–7 mm. longo, apice calycis lobis conniventibus coronatis.

SOLOMON ISLANDS: Ulawa, *Brass* 2971 (TYPE), October 1932, common on ocean foreshores (small tree or tall shrub with a few stiffly spreading branches; peduncle and pedicels red; calyx-tube cream-colored, lobes pale pink; petals and stamens white; fruit red, rugose).

This species suggests *Syzygium goniopterum* (Diels) comb. nov. (*Jambosa gonioptera* Diels Bot. Jahrb. **57**: 391. 1922), and *Eugenia stelechanthoides* Kaneh. It appears to be distinct from both by the obtusely acute leaves and the larger pyriform flowers; the fruits too are not like those of the second species.

***Syzygium pyrifforme* sp. nov.**

Arbor 6–10 m. alta; ramulis tenuibus 4-angulatis brunnescentibus; foliis impellucidis chartaceis vel tenuiter coriaceis, lineari-lanceolatis, 5.5–12 cm. longis, 1–2.7 cm. latis, basi rotundato-cuneatis vel cuneatis apice tenuiter acuminatis vel subcaudatis, acumine 1–2 cm. longo basi 3 mm. lato interdum leviter curvato, costa supra canaliculata subtus prominente, nervis primariis utrinsecus 10–12 supra insculptis subtus prominulis in venam intramarginalem 2–3 mm. a margine confluentibus, reticulo obscuro; petiolo 3–5 mm. longo atrofusco; floribus e trunco ortis fasciculatis; pedunculo brevissimo 1–2 mm. longo; pedicello 4–7 mm. longo tetragono; alabastris 1.5 cm. longis, turbinatis stipitatis, calycis tubo 14 mm. longo incl. stipite 2–4 mm. longo, obscure puberulo, lobis 4 brevibus $\pm$ 2.5 mm. longis, 4 mm. latis in anthesi $\pm$ fractis; petalis subrotundatis $\pm$ 7 mm. longis; staminibus $\pm$ 2 cm. longis, antheris anguste oblongis 2 mm. longis; fructibus ignotis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6966 (TYPE), June 1936, alt. 100 m., common in flooded riverine forest (small richly branched tree 6–10 m. high, with numerous small fascicles of showy flowers lateral on lower stem below the branches; calyx rose pink; petals green; stamens yellow).

In description this plant approaches *Syzygium Dielsianum* nom. nov. (*Jambosa pycnantha* Diels Bot. Jahrb. **57**: 394. 1922). In the latter, a plant of higher altitude, the leaves are broader, and the flowers are a little smaller, differing in both shape and color from those here described. The specific name *pycnanthum* is pre-empted in *Syzygium*.

Syzygium samarangense (Blume) Merr. & Perry, Jour. Arnold Arb. **19**: 115, 216. 1938, Mem. Am. Acad. Sci. **18**(3): 167 (Mem. Gray Herb. **4**: 167). 1939.

Myrtus samarangensis Blume Bijdr. 1084. 1826.

Eugenia javanica Lam. Encycl. **3**: 200. 1789; Engler, Bot. Jahrb. **7**: 468. 1886; Lane-Poole, Rep. For. Res. Papua 125. 1925, non *Syzygium javanicum* Miq.

Jambosa javanica K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 470. 1900; Rechinger, Denkschr. Mat.-Nat. Kl. Akad. Wiss. Wien **89**: 585 (Bot. Zool. Ergeb. Wiss. Forsch. Samoa-I. Neug.-Arch. Salomonsins. **5**: 143). 1913; Diels, Bot. Jahrb. **57**: 387. 1922.

SOLOMON ISLANDS: San Cristobal: Huru River, *Brass* 3006, October 1932, rare on river bank (large spreading tree with blotched brown bark peeling in large thin flakes; hard brown wood; leaves thin, shining; petioles red; flowers white); Y s a b e l: Meringe, *Brass* 3182, November 1932, alt. 20 m., limestone hills (tree 25 m. tall; hard brown wood; brown wrinkled bark exfoliating in thin flakes; fruit red, about 3.5 cm. diameter).

Possibly also belonging to this species in its wider sense, or closely re-

lated, is a collection from BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8102, October 1936, rain-forest, lesser canopy tree of flood plains (stem spurred at base; bark thick, pale brown; flowers waxy cream-colored, very numerous on old wood). The leaves of this collection are something like those of *Syzygium ovalifolium* (Blume) comb. nov. (*Jambosa ovalifolia* Bl. Mus. Bot. Lugd.-Bat. 1: 98. 1849), but the inflorescence does not correspond to the description of that species.

Syzygium vernicosum sp. nov.

Arbor magna; ramulis brunnescentibus in sicco cortice longitudinaliter rugulosis $\pm$ sulcatis; foliis in sicco olivaceis vel flavo-viridescentibus supra vernicosis subtus opacis impellucidis valde coriaceis laxè inconspicueque reticulatis, ellipticis vel oblongis, 15–20 cm. longis, 5–8.5 cm. latis, basi rotundatis vel rotundato-cuneatis apice abrupte obtuse acuminatis margine anguste revolutis, costa supra canaliculata subtus prominente, longitudinaliter rugulosa, nervis primariis utrinsecus 8–12 utrinque perspicuis oblique adscendentibus inter se $\pm$ 1.5 cm. remotis marginem versus arcuatim confluentibus interdum venam intramarginalem formantibus vel 2–3 infimis liberis sursum evanescentibus, secundariis fere aequaliter prominulis; petiolo $\pm$ 2 cm. longo, 3–4 mm. crasso atrofusco ruguloso in dimidio superiore supra inconspicue canaliculato; inflorescentiis e nodis defoliatis ortis, rhachi usque 2.5 cm. longa $\pm$ 5 mm. diametro, $\pm$ 4-angulata; floribus subracemosis vel interdum subumbellatis, magnis; alabastris tantum visis, $\pm$ 2.8 cm. longis; calycis tubo parte inferiore striato-ruguloso subcylindrico $\pm$ 1 cm. longo 4–5 mm. crasso, superiore campanulato 0.8 cm. longo vix infra lobis leviter constricto, circiter 1.2 cm. diametro, lobis rotundatis exterioribus 0.5 cm. longis, 1 cm. latis, interioribus 1 cm. longis.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8113 (TYPE), October 1936, rain-forest, occasional on the ridges (large spur buttressed canopy tree; bark pale brown, thick, shedding in soft scales; leaves stiff, yellow beneath; flowers pink, very numerous on the smaller branches; peduncles 4-angled).

Among the species described from Papua, the collection is perhaps related to *Syzygium Leonhardi* (Diels) Merr. & Perry. However, in our species, the upper surface of the leaves shines almost as if varnished, the primary veins are almost equally prominent on both surfaces, the inflorescence has a definite axis on which the flower-buds are subsessile, there being a very short or thin base articulated between them and the axis.

Syzygium virescens sp. nov.

Arbor parva 5–6 m. alta; ramulis compressis atrofuscis; foliis coriaceis supra brunnescentibus subtus pallidioribus inconspicue laxè reticulatis minute atro-glandulosis, lanceolatis, 20–30 cm. longis, 6–8 cm. latis, basi cuneatis apice? (fractis), margine vix recurvatis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus 7–10 regularibus cum vena intramarginali 5 mm. a margine distante supra insculptis subtus elevatis; petiolo circiter 1 cm. longo basi crassiusculo; inflorescentiis e trunco infero ortis, $\pm$ 4 cm. longis, a basi pauciramosis vel subfasciculatis; floribus sessilibus, calycis tubo $\pm$ 1 cm. longo basi 3 mm. stipitato supra 7 mm. obconico in sicco leviter striato-ruguloso, lobis 4 rotundatis, exterioribus 1.5 mm. longis, interioribus 3 mm. longis; petalis rotundatis $\pm$ 7 mm. longis singillatim deciduis; staminibus 2 cm. longis; fructibus ignotis.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass 13950* (TYPE), April 1939, alt. 50 m., frequent in rather swampy forest on river-plains (undergrowth tree 5–6 m. high; flowers greenish white, clustered on lower stem).

This species seems to be most like *Syzygium gonatanthum* (Diels) Merr. & Perry, but the leaves are very distinctly coriaceous, narrower than in Diels's species, and the nerves are conspicuously impressed on the upper surface.

D. Inflorescence terminal and axillary (also lateral in S. heterobotrys).

Syzygium brevicymum (Diels) comb. nov.

Jambosa brevicyma Diels, Bot. Jahrb. **57**: 389. 1922.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13223*, March 1939, alt. 850 m., rain-forest, plentiful on river banks (low flat-branching flood-resistant tree 3–5 m. high; flowers white).

This collection appears to be relatively close to the description of this species. Leaves somewhat coriaceous, 11–16 cm. long, 3–4.5 cm. broad, with petiole 5 mm. long; inflorescence 3–4 cm. long; calyx-tube $\pm$ 1 cm. long, 7 mm. broad at the apex. Without access to the type, we think the collection is better placed here than elsewhere at present.

Syzygium evenulosum sp. nov.

Arbor $\pm$ 19 m. alta, 41 cm. diametro; ramulis teretibus vel vix obtuse angulatis brunnescentibus; foliis coriaceis in sicco supra olivaceis vel atro-brunnescentibus obscure reticulatis subtus fulvo-brunnescentibus haud reticulatis consperse pellucido-punctatis vel impellucidis, ellipticis vel late oblongis, 11–21 cm. longis, 4.5–9 cm. latis, basi breviter cuneatis apice leviter recurvato breviter abrupte acuminatis margine leviter recurvatis, costa supra canaliculata subtus prominente, nervis primariis utrinsecus 12–15 utrinque manifestis inconspicuis patenti-adscendentibus 7–10 mm. a margine arcuatim conjunctis, supra interdum vena submarginali secundaria vix manifesta; petiolo 1–1.5 cm. longo atrofusco; inflorescentiis axillaribus terminalibusque interdum e nodis defoliatis ortis, 3–4 cm. longis parce ramosis, alabastris sessilibus glandulosis; calycis tubo obconico vel obpyramidato basi 3 mm. apice sub lobis 10–12 mm. diametro, lobis late rotundatis, interioribus $\pm$ 6 mm. exterioribus $\pm$ 4 mm. longis; petalis subrotundatis 8–10 mm. longis, breviter unguiculatis, margine crispule undulatis; staminibus $\pm$ 1.5 cm. longis, antheris oblongis 1 mm. longis; fructibus non visis.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh 14108* (TYPE), May 1939, alt. 80 m., primary rain-forest of lower mountain slopes (tree 19 m. high, 41 cm. diameter; bark brown, scaly; flowers white).

This species appears to be a close ally of *Syzygium nutans* (K. Schum.) Merr. & Perry. It may be distinguished from the latter by the coriaceous leaves with inconspicuous venation, the sparsely branched inflorescence, and the smaller white flowers.

Syzygium Forbesii (Greves) comb. nov.

Eugenia Forbesii Greves, Jour. Bot. **61**: Suppl. 16. 1923.

The following specimens are very close to the description of this species: BRITISH NEW GUINEA: Bisiatabu, *Brass 600*; Borabere, *Brass 737*.

Syzygium goniocalyx (Lauterb.) comb. nov.

Jambosa goniocalyx Lauterb. Nov. Guin. **8**: 851. 1912; Diels, Bot. Jahrb. **57**: 390. 1922; White, Jour. Arnold Arb. **10**: 251. 1922.

BRITISH NEW GUINEA: Sturt Island, Lower Fly River, *Brass* 8137, October 1936, flood plain rain-forest (river bank tree 10 m. high; bark reddish, flaky; leaves citronella-scented; flowers greenish white); Wame River, Purari Delta, *Brass* 1079, February 1926, rain forests (tree $\pm$ 9 m. high, with bright brown flaky bark; inflorescence lateral or leaf-opposed; fruit solitary or two together on a peduncle 2.5 cm. long).

In addition, we have *Brass* 657 named by Diels. Although flowering material forms the main part of the collection of *Brass* 8137, there is in it an immature globose-turbinate 9 mm. stipitate fruit about 2 cm. in diameter, which is valid proof that *Brass* 1079, an earlier unnamed fruiting specimen with fruit about 3 cm. diameter also belongs here. The fruit is 8-costate, with the costae thickish and obtuse rather than acute as in the flower; it has a single large seed about 2 cm. in diameter.

Syzygium jambosoides (Lauterb.) comb. nov.

Careya jambosoides Lauterb. Nov. Guin. **8**: 313. 1910; Knuth, Pflanzenr. **105**(IV. 219): 73. 1939.

Eugenia jambosoides O. Schwarz, Rep. Spec. Nov. **24**: 90. 1927.

BRITISH NEW GUINEA: Gaima, Lower Fly River (east bank), *Brass* 8301, November 1936, rare in open savannah-forest (compact xerophytic tree 8 m. high; bark thick, rough, fibrous scaly; leaves greyish beneath, nerves more prominent above; petioles red; flowers white, showy; fruit red).

This collection seems to agree very well with Lauterbach's description and Schwarz's discussion of this species except in the last phrase, "seminibus permultis ellipsoideis in pulpa carnosâ nidulantibus." Whether Lauterbach had a fruit from some other collection we do not know, and Schwarz does not discuss this character at all. In the summary before his discussion of the New Guinean type, however, he points out that the species is distinguished by the leaf-form and venation, the compact small but richly flowered cymes with medium-sized flowers, and the 2-seeded fruits. The fruit may also be 1-seeded, but this is a variation well within the limits of the genus.

Syzygium lagerstroemioides sp. nov.

Arbor magna; ramulis vetustioribus subcinereis novellis brunnescentibus compressis sulcatis; foliis chartaceis minute subobscure pellucido-punctatis inconspicue reticulatis supra olivaceis subtus pallidioribus consperse minute atro-glandulosis, anguste obovatis vel ellipticis, 13–17 cm. longis, 5–6 cm. latis, basi cuneatis apice (saepissime fractis) acuminatis(?), costa supra canaliculata subtus elevata, nervis primariis utrinsecus 18–20 oblique patentibus supra leviter insculptis subtus prominulis in venam intramarginalem 2–3 mm. a margine confluentibus; petiolo 2–4 mm. longo; inflorescentiis terminalibus vel axillaribus, ramosis, circiter 15 cm. longis; floribus non visis; fructibus in sicco $\pm$ 3.5 cm. longis (incl. 1 cm. stipitatis), parte superiore globosa calycis lobis coronata, $\pm$ 2 cm. diametro, crebre verruculosa valde multicostata ($\pm$ 20), calycis lobis 4 minute glandulosis haud verruculosus vel costatis, majoribus in sicco 6 mm. longis, 1 cm. latis.

BRITISH NEW GUINEA: Eastern Division, Kurandi, *Brass* 1393 (TYPE), May 1926, river banks (large tree with bright pale brown papery bark; inflorescence axillary and terminal; fruit green, rugose, prominently ribbed).

The leaves and the branchlets of this species as well as the branching of the inflorescence strongly suggest *Syzygium goniocalyx* (Lauterb.) Merr. & Perry, but in the latter the flower is more or less strongly 8-ribbed or angled and not at all tuberculate. The fruit of *Brass 1393* has many more ribs and is covered with small excrescences which must surely in some degree appear on the flower.

***Syzygium nutans* (K. Schum.) comb. nov.**

Eugenia nutans K. Schum. in K. Schum. & Hollr. Fl. Kaiser Wilhelms Land 90. 1889.

Jambosa nutans (K. Schum.) Niedenzu in Engl. & Prantl, Nat. Pflanzenfam. **3**(7): 84. 1893; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 470. 1900; Diels, Bot. Jahrb. **57**: 395. 1922, Nov. Guin. **14**: 92. 1924; C. T. White, Jour. Arnold Arb. **10**: 251. 1929.

SOLOMON ISLANDS: **Bougainville**: Karngu, Buin, *Kajewski 2248*, October 1930, sea-level, common in rain-forest (medium sized tree up to 18 m. high; flowers with large green calyx, white petals and masses of cream-colored stamens); **Guadalcanal**: Berande, *Kajewski 2400*, January 1931, common in rain-forest (small tree 7 m. high; flowers with green calyx, cream petals and white stamens; fruit shiny pink when ripe, 11 cm. long, 9 cm. diameter, $\pm$ lime-shaped); **San Cristobal**: Waimamura, *Brass 2649*, August 1932, coast, not common, on bank of a small stream in the rain-forest (loosely branched shrub 2 m. tall; leaves dull green, pale below; fruit solitary, terminal, reddish pink, up to 10 cm. long, 6 cm. diameter, very buoyant).

We have compared these specimens with Schumann's original description, Diels' elaborated one, and flowers of *Brass 1414*, identified by Diels. The only differences we find are in the color of the flowers and the size of the fruits. With no material available for comparison we cannot say whether these differences are specific or not, but we are inclined not to think so at present.

***Syzygium pteropodum* (Lauterb. & K. Schum.) comb. nov.**

Jambosa pteropoda Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 473. 1900; Lauterb. Nov. Guin. **8**: 850. 1912; Diels, Bot. Jahrb. **57**: 392. 1922.

NETHERLANDS NEW GUINEA: Albatros Bivak, v. *Leeuwen 9660*, July 1926, alt. 50 m.
NORTHEASTERN NEW GUINEA: Yunzaing, *Clemens 3620, 3759*, July 1936, alt. $\pm$ 1500 m.

***Syzygium puberulum* sp. nov.**

Arbor parva; ramis cinerascentibus; ramulis compressis brunnescentibus; foliis chartaceis consperse pellucido-punctatis vel semi-impellucidis, lineari-oblongis vel oblongis, 11–16 cm. longis, 2–3.5 cm. latis, basi obtuse cuneatis apice acuminatis, margine in sicco leviter undulatis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus 18–22 oblique ascendentibus in venam intramarginalem vix 2 mm. a margine confluentibus utrinque manifestis non prominulis; foliis minutis apice ramulorum lanceolatis 5–7 mm. longis; petiolo 3 mm. longo atrofusco; inflorescentia terminali in ramulo axillari brevi circiter 12 cm. longa racemosa, apice congeste 5-flora, 2 floribus lateralibus ad nodum tumidum in pedicello 1 mm. longo; floribus in anthesi non visis; fructibus immaturis, calycis tubo turbinato-obconico vel obconico, $\pm$ 18 mm. longo incl. stipite 2–3 mm., apice 12–14 mm. diametro, extus brevissime velutino, lobis 4, $\pm$ fractis, disco stamineo circiter 1.5 mm. lato.

BRITISH NEW GUINEA: Port Moresby, *Brass 838* (TYPE), December 1925, gully rain-forests (small tree about 4.5 m. tall; branches horizontal; smooth greenish bark exfoliating in thick flakes; fruit dull green, immature).

This collection differs from the description of *Syzygium megalospermum* (Lauterb. & K. Schum.) comb. nov. (*Jambosa megalosperma* Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 472. 1900) in the much longer inflorescence and in the indument on the young fruit. The minute leaves at the apex of the branchlets suggest perhaps some relationship to that group of species which have very small bract-like leaves in pairs at the apex of the branches and between the pairs of leaves of regular size. If this be true, then the species here described is probably allied to *Syzygium argyrocalyx* (Warb.) comb. nov. (*Eugenia argyrocalyx* Warb. Bot. Jahrb. 13: 390. 1891).

Syzygium Randianum sp. nov.

Arbor 30 m. alta; ramulis ultimis compressis cinereo-brunneis 2-3 mm. diametro; foliis tenuiter coriaceis in sicco olivaceo-viridibus copiose pellucido-punctatis supra nitidis subtus opacis utrinque crebre manifeste reticulatis, ellipticis vel obovato-ellipticis, 12-17 cm. longis, 4.5-8 cm. latis, basi rotundato-cuneatis, apice acuminatis ac paullo recurvatis, costa supra canaliculata subtus prominula, nervis primariis utrinsecus 12-16 oblique adscendentibus prope marginem $\pm$ arcuatim confluentibus interdum venam intramarginalem formantibus infimis 2-3 longe adscendentibus; petiolo $\pm$ 1 cm. longo supra canaliculato brunnescente; inflorescentiis apice ramulorum foliiferorum quam caeteris crassiorum ($\pm$ 7 mm. diametro) sessilibus paucifloris; floribus magnis basi bibracteatis, bracteis ovatis 4 mm. longis obtusis rigidis; calycis tubo cylindrico vel subquadrangulati 1.7-2 cm. longo 8-9 mm. diametro, lobis 4 valde concavis interdum paullo compressis rotundatis crebre glandulosis exterioribus 1 cm. longis interioribus 1.5 cm. longis; petalis crebre glandulosis circiter 2 cm. longis rotundatis margine tenuibus undulatis; staminibus $\pm$ 3 cm. longis, antheris 1.5 mm. longis; fructibus ignotis.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, Brass 6673 (TYPE), May 1936, alt. 80 m., flood banks of a small creek (canopy tree 30 m. tall; stem flange-buttressed; bark pale reddish brown, 2 cm. thick, peeling in very small thin flakes; leaves smooth and shining; large cream-white flowers $\pm$ 7 cm. long crowded at ends of short thickened branchlets).

In the collection being worked over there are two species which appear to have the inflorescence terminal on short thickened branchlets: *Syzygium dictyophlebium* and *S. Randianum*. In the first is a branching inflorescence; the second consists of a compact cluster of 9-10 large sessile flowers each subtended by two rather rigid spreading bracts. In two of the flowers abnormalities occur; in one, one of the pair of bracts has grown up with the calyx-tube, while in the other, both bracts are at the base of the calyx-lobes; the normal position, as in other species, is at the base of the calyx-tube.

This species, by its short inflorescence and the elongate cylindric or subquadrangular ovary, suggests *Syzygium caryophylloides* (Lauterb.) comb. nov. (*Jambosa caryophylloides* Lauterb. Bot. Jahrb. 45: 363. 1911) from the Bismarck Archipelago, but the latter has very much smaller flowers. Dedicated to Dr. A. L. Rand, the ornithologist of the Expedition.

***Syzygium spectabile* sp. nov.**

Arbor 4 m. alta; ramulis subcompressis atrocinereis; foliis (uno tantum viso) chartaceis glabris utrinque laxissime reticulatis elongato-ovatis, 57 cm. longis, 27 cm. latis, basi rotundatis apice ? (apice summo fracto), costa subtus conspicua, nervis primariis utrinsecus 18 tenuibus supra manifestis subtus prominulis oblique patentibus in venam intramarginalem arcuatim prominulam $\pm$ 1 cm. a margine distantem confluentibus, vena intramarginali secundaria cum primaria subparallela inconspicua 2–4 mm. a margine disposita; petiolo 3.5 cm. longo circiter 8 mm. crasso supra plano subtus rotundato rugoso; floribus in panícula cymosa pauciflora (in specimine typico 4-floris), axi 2.5 cm. longo, ramis circiter 1 cm. longis; floribus sessilibus apice ramorum solitariis; calycis tubo $\pm$ 3 cm. longo infero breviter stipitiformi 6–7 mm. longo, medio subconico circiter 1.2 cm. longo latoque, supero ad $\pm$ 3 cm. lato ampliato, lobis 4 rotundatis minoribus 7 mm. longis majoribus 1.3 cm. longis 2 cm. latis; petalis ovatis 3.5 cm. longis basi unguiculatis, unguicula 6–7 mm. lata; staminibus numerosis $\pm$ 4 cm. longis, filamentis exterioribus in dimidio inferiore coalitis, interioribus discretis vel 2–3 coalitis, antheris exterioribus anguste oblongis 2.5 mm. longis, interioribus minoribus; fructibus non visis.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 12995* (TYPE), February 1939, alt. 1200 m., rain-forest undergrowth (one example: tree 4 m. high; calyx red; petals reddish pink; stamens greenish white).

The collection consists of the tip of a branch with one leaf, the upper part of another, and a terminal inflorescence with a cyme at the apex and one lower branch, the opposite one being either broken off or undeveloped. Possibly this species is allied to *Syzygium nutans* (K. Schum.) Merr. & Perry, but it differs in the shape of the leaves and in having the outer filaments grown together in the lower half of their length. This coalition of the filaments is of various lengths, but the mass of stamens may be removed in a ring with the filaments unevenly loose in the upper part; the inner stamens are separated or sometimes united in twos or threes. The value or stability of this character we have been unable to determine.

(*To be concluded*)

JOURNAL
OF THE
ARNOLD ARBORETUM

VOL. XXIII

JULY, 1942

NUMBER 3

PLANTAE PAPUANAE ARCHBOLDIANAE, IX

E. D. MERRILL AND L. M. PERRY

Concluded from page 265

C. Flowers smaller, less than 8 mm. in diameter immediately below the calyx-lobes.

E. Calyx-lobes unequal, the outer a little smaller than the inner, 2–5 mm. long.

F. Inflorescence lateral.

***Syzygium dictyophlebium* sp. nov.**

Arbor gracilis circiter 16 m. alta; ramulis teretibus vel leviter compressis cinereo-fuscis; foliis tenuiter coriaceis consperse pellucido-punctatis manifeste reticulatis in sicco brunneo-viridibus ellipticis, 8.5–15 cm. longis, 4.5–7 cm. latis, basi rotundato-cuneatis decurrentibus, apice recurvatis abrupte breviter obtuse acuminatis, acumine $\pm$ 5 mm. longo, costa supra impressa subtus elevata, nervis primariis subirregulariter dispositis compluribus tantum paullo quam secundariis ac reticulo prominulioribus late patentibus fere subtransversis in venam intramarginalem $\pm$ 3 mm. a margine confluentibus, interdum vena intramarginali secundaria cum primaria subparallela disposita; petiolo 1–1.3 cm. longo basim versus margine adpresso; inflorescentiis apice ramulorum brevium (20 cm. longo) quam caeteris crassiorum (7–9 mm. diametro) ramosis usque 8 cm. longis ac 15 cm. latis; floribus non visis; fructibus albis crebre glandulosis immaturis depresso globosis (1.3 cm. diametro), basi 1 mm. stipitatis, apice calycis lobis coronatis; lobis inaequalibus rotundatis exterioribus brevioribus, interioribus circiter 3 mm. longis.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5338 (TYPE), October 1933, alt. 1250 m., limestone forest (slender tree about 16 m. high; pale brown scaly bark; numerous panicles of white glandular fruit on old wood below the leaves).

***Syzygium insculptum* sp. nov.**

Arbor parva 6 m. alta; ramulis acute tetragonis fulvis; foliis coriaceis impellucidis supra viridibus subtus pallidioribus manifeste laxe reticulatis oblongo-ellipticis, 24–37 cm. longis, 9.5–14 cm. latis, basi cuneatis vel obtusis apice acuminatis, acumine $\pm$ 2 cm. longo, margine anguste recurvatis, costa supra canaliculata, subtus elevata, nervis primariis utrinsecus 17–25 potenti-adscendentibus in venam intramarginalem perspicuam

4 mm. a margine remotam conjunctis, supra insculptis subtus perspicuis; petiolo $\pm$ 8 mm. longo, 3 mm. crasso atrofusco; inflorescentiis e nodis defoliatis ortis interdum axillaribus; paniculis fasciculatis; rhachi usque 4 cm. longa ramulisque tetragonis interdum anguste alatis; floribus sessilibus basi bibracteatis, bracteis oblongis $\pm$ 3 mm. longis caducis; alabastris nitidis 9–10 mm. longis; calycis tubo pyriformi in sicco 7 mm. longo, 5–6 mm. diametro circumcirca manifeste costato, venis 12 fere ad apicem loborum adscendentibus, lobis 4 circiter 2 mm. longis 4 mm. latis valde concavis.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, *Brass 6681* (TYPE), May 1936, alt. 80 m., undergrowth small tree in a gully (6 m. high; leaves stiff, glossy, with deeply impressed nerves and prominent marginal vein; numerous lateral fascicles of unopened white flowers).

This species should be compared with *Syzygium rubropunctatum* (Ridl.) comb. nov. (*Eugenia rubropunctata* Ridl. Trans. Linn. Soc. Bot. II. 9: 46. 1916). The leaves have like characters and the inflorescences are lateral. The flowers are only in bud but they are twice the size of those described by Ridley and have dried in a regular pattern with 12 narrow ridges about 0.5 mm. broad almost evenly distributed, four extend almost to the apex of the lobes in the position of the midrib, between each two of these are two more, slightly less prominent, which part below the base of the adjacent lobes, one going to each lobe. In Ridley's species the calyx is described as rugose when dry.

***Syzygium Lauterbachianum* nom. nov.**

Syzygium floribundum Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 476. 1900, non F. v. Muell. (1864).

Jambosa floribunda (Lauterb. & K. Schum.) Diels, Bot. Jahrb. 57: 388. 1922.

BRITISH NEW GUINEA: Gaima, Lower Fly River (east bank), *Brass 8273*, November 1936, on tidal foreshores (fresh water) (compact tree 5–6 m. high; flowers cream-colored, fragrant; flower-buds brown); Lower Fly River, east bank opposite Sturt Island, *Brass 8211*, October 1936, rain-forest on low river banks (common tree 10–15 m. high with rather open leafage and striking reddish bark; flowers white, shining smooth brown in the bud).

These collections agree very well with the original description and, as Diels has already pointed out, are very near *Eugenia Tierneyana* F. v. Muell.

***Syzygium Lauterbachianum* var. *phaeophloium* var. nov.**

A forma typica differt venis foliorum primariis arcuatim 5–9 mm. a margine remotis confluentibus, vena submarginali secundaria cum primaria subparallela disposita; calycis tubo basi 2–3 mm. stipitato supra subabrupte circiter 5 mm. campanulato-obconico.

SOLOMON ISLANDS: Bougainville: Kieta, *Kajewski 1543*, March 1930, rain-forest, on fresh water creek banks (tree up to 30 m. high; fruit dark red plum color when ripe, 2 cm. long, 1.7 cm. diameter). Guadalcanal: Mamassa, Konga, *Kajewski 2491*, February 1931, alt. 400 m., common on banks of creeks and rivers in rain-forest (tree up to 25 m. tall; bark brown; petals cream touched with pink; very strong wood); Sorvorhio Basin, *Kajewski 2703*, January 1932, alt. 300 m., rain-forest (tree up to 30 m. with brown flaky bark; petals pink and white outside, white inside; stamens white; wood heavy). San Cristobal: Magoha River, *Brass 2752*, August 1932, common in rain-forests of coast hills (tree up to 30 m. tall with compact crown; bright reddish brown bark peeling in very thin papery flakes; flowers white).

A very conspicuous species). *Y s a b e l*: Garona, *Brass* 3371 (TYPE of var.), lowland rain-forests (large tree with reddish bark peeling in thin papery flakes; leaves dull, paler beneath; flowers white).

In the Solomon Islands material the primary veins are arcuately confluent well within the margin forming a remotely crenate submarginal vein, while closer to the margin and more or less parallel is a fainter secondary vein. The flowers are turbinate rather than clavate; nevertheless there is so much similarity between the New Guinea and the Solomon Islands material that we do not at present regard them as specifically distinct.

Syzygium malaccense (Linn.) Merr. & Perry, Jour. Arnold Arb. **19**: 215. 1938; Mem. Am. Acad. Sci. **18**: 154 (Mem. Gray Herb. **4**: 154). 1939.

Eugenia malaccensis Linn. Sp. Pl. 470. 1753.

BISMARCK ARCHIPELAGO: New Britain: Siwai, *Waterhouse* 102, 110, 200; Gazelle Peninsula, *Waterhouse* 254. SOLOMON ISLANDS: Bougainville: Kugumaru, Buin, *Kajewski* 1814, June 1930, alt. 150 m., rain-forest. Malaita: Quoi-monapu, *Kajewski* 2322, December 1930, alt. 50 m., rain-forest. San Cristobal: Huro River, *Brass* 2602, August 1932, lowlands. *Y s a b e l*: Sigana, *Brass* 3464, January 1933, alt. 20 m., bed of a small rocky creek.

The field notes indicate a large tree with short flanged trunk, brown flaky bark, very showy pink short inflorescences on the branches, pink fruit up to 6 cm. long, 4 cm. diameter, with a crisp subacid flavor. A species growing wild and also planted in native villages.

Syzygium multiglandulosum sp. nov.

Arbor $\pm$ 30 m. alta; ramis ramulisque subteretibus brunnescentibus; foliis chartaceis vel tenuiter coriaceis crebre pellucido-punctatis in sicco supra olivaceis subtus leviter pallidioribus oblongo-ellipticis vel ellipticis, 7–12 cm. longis, 3.5–5.5 cm. latis, utrinque subrotundatis deinde basi breviter cuneatis apice recurvato-falcatis acuminatis margine vix recurvatis, costa supra canaliculata subtus prominente, nervis primariis patentiadscendentibus utrinsecus $\pm$ 12 utrinque prominulis in venam intramarginalem 5 mm. a margine confluentibus, vena submarginali secundaria circiter 1 mm. a margine remota, venulis prominulis reticulum crebrum efformantibus cum nervis primariis subparallelum; petiolo 1–1.5 cm. longo; inflorescentiis non visis; fructibus subglobosis $\pm$ 4 cm. diametro calycis lobis 4 (rotundatis $\pm$ 1 cm. longis rigidis) coronatis; pericarpio 5 mm. crasso.

NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13194 (TYPE), March 1939, alt. 850 m., frequent on slopes in primary rain-forest (tree 30 m. high, 42 cm. diameter; bark red, scaly; fruit green); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12548, February 1939, alt. 1150 m., frequent in primary forest (tree 30 m. high, 67 cm. diameter; bark scaly, red; young fruit green, ripe ones dark red); Bernhard Camp, Idenburg River, *Brass & Versteegh* 13577, occasional in primary forest (tree 27 m. high, 51 cm. diameter; bark 11 mm. thick, red-brown, scaly).

This species closely resembles *Syzygium phaeostictum* Merr. & Perry in habit. There is, however, a very distinct difference in the venation of the leaves. In the former, the secondary venation is very close, the main veins of the reticulum tending to be parallel with the primary nerves. In the latter, the secondary venation is less marked and more open, the veins of the reticulum meeting the primary ones at various angles. In both the

leaves are copiously punctate and have a recurving apex, and both species have a lateral inflorescence.

The label of no. 12548 indicates that the fruits were separated from the foliar specimen. Unfortunately, there was an error in the labelling, and the only fruits we could find which might belong to the specimen are two about 5.5 cm. diameter and a little bit longer. This has a single seed 3.5–4 cm. diameter. On account of the number on the packet not matching the foliar specimen, we have hesitated to include this larger sized fruit in our description, but we feel reasonably sure it belongs with this species.

***Syzygium phaeostictum* sp. nov.**

Arbor $\pm$ 40 m. alta; ramis cinereis; ramulis compressis fulvis glandulosis; foliis chartaceis utrinque reticulatis crebre glanduloso-puncticulatis in sicco supra olivaceis subtus pallidioribus, oblongo-ellipticis, 7–12 cm. longis, 3–4.5 cm. latis, utrinque sensim rotundatis deinde basi breviter cuneatis vel acutis apice acuminatis (apice acuminato recurvo habitu in speciminibus siccis plerumque falcato), margine leviter recurvatis, costa supra interdum paullo canaliculata subtus prominente, nervis primariis subirregulariter dispositis utrinque prominulis utrinsecus 7–10 patentiadscendentibus $\pm$ 4 mm. a margine arcuatim confluentibus, vena submarginali secundaria 1–1.5 mm. a margine remota, venulis prominulis reticulum laxius irregulare cum venis primariis haud parallelum; petiolo 1–1.5 cm. longo; paniculis e nodis defoliatis ortis 4–6 cm. longis latisque; floribus $\pm$ 5 mm. pedicellatis vel interdum sessilibus; calycis tubo turbinato 8 mm. longo (incl. basi 1–1.5 mm. stipitato) apice circiter 6–8 mm. diametro, lobis 4 late rotundatis exterioribus 2 mm. longis interioribus paullo longioribus; petalis 5 mm. longis rotundatis; staminibus 1.5–2 cm. longis, antheris $\pm$ 1 mm. longis; fructibus ignotis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, Brass & Versteegh 11935 (TYPE), 11941, January 1939, alt. 1630 m. and 1600 m., frequent in rain-forest of slopes (large canopy tree 31–41 m. tall; bark grey, scaly; flowers red, white, and pink).

This species has some features in common with the descriptions of *Syzygium alutaceum* (Diels) comb. nov. (*Jambosa alutacea* Diels, Bot. Jahrb. 57: 386. 1922) and *Syzygium daphnoides* (Greves) comb. nov. (*Eugenia daphnoides* Greves, Jour. Bot. 61: Suppl. 15. 1923). But, in our species, the flowers are a little larger, and the chartaceous leaves are copiously glandular with the venation equally obvious on both surfaces. The acuminate apices of the leaves are all moderately recurved and somewhat falcate.

***Syzygium roseum* sp. nov.**

Arbor magna; ramis ramulisque cinereo-fuscis teretibus vel compressis; foliis tenuiter coriaceis in sicco olivaceo-viridibus subtus flavo-virentibus consperse minuteque atroglandulosis oblongis vel anguste ellipticis, 5.5–9 cm. longis, 2.5–4.5 cm. latis, basi cuneatis apice recurvatis, breviter obtuseque acuminatis, margine anguste recurvatis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus 5–7 oblique adscendentibus marginem versus gradatim arcuatis confluentibus utrinque inconspicuis; petiolo $\pm$ 1 cm. longo parte inferiore crassiusculo fusco; inflorescentiis e nodis defoliatis ortis 2.5–3 cm. longis, paucifloris, bracteis cito caducis; floribus

post anthesim apice ramulorum solitariis; calycis tubo 8–10 mm. longo (incl. basim stipitatum 1.5–3 mm.) supra obconico-subcampanulato, lobis 4 rotundatis 2.5–3 mm. longis et circiter 3.5 mm. latis; staminibus non visis; stylo $\pm$ 2 cm. longo; fructibus immaturis subglobosis $\pm$ 1.5 cm. diametro calycis lobis coronatis, basi brevissime stipitatis.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5816 (TYPE), January 1934, alt. 5 m., riverbank rain-forest (heavy boled, large tree with brown rough scaly bark and heavy dark brown wood; past flowering; numerous very young dark pink fruit).

This species is perhaps nearest *Syzygium keroanthum* (Diels) comb. nov. (*Jambosa keroantha* Diels, Bot. Jahrb. 57: 385. 1922) which, according to Diels's key l. c. 380, has larger axillary and terminal inflorescences, and leaves somewhat prominently nerved. The best characters of this species are perhaps the fairly smooth yellowish tinged leaves with venation (except the midrib) scarcely raised on either surface and tending to be inconspicuous, and the short lateral inflorescences with shortly stipitate obconical to subcampanulate flowers (immature fruits).

F. Inflorescence terminal.

Syzygium Archboldianum sp. nov.

Arbor parva; ramulis teretibus atrofusis novellis ad apicem interdum puberulis; foliis chartaceis vel tenuiter coriaceis minute crebreque pellucido-punctatis inconspicue reticulatis ellipticis, 10–17 cm. longis, 5–7 cm. latis, utrinque angustatis basi cuneatis interdum paullo obliquis apice breviter acuminatis margine leviter anguste recurvatis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus 8–12 oblique patentibus 4–7 mm. a margine arcuatim confluentibus; petiolo $\pm$ 1 cm. longo interdum glanduloso-puberulo; paniculis terminalibus subcorymbosis, 8–10 cm. longis, 14–18 cm. latis, basim versus cymoso-ramosis vel breviter pedunculatis, rhachi ramisque leviter, ramulis copiose glanduloso-puberulis; floribus in apice ramulorum solitariis vel ternis pedicellatis, flore centrali sessile vel breviter pedicellato; alabastris turbinato-obconicis usque 1.5 cm. longis apice subglobosis creberrime glandulosis; calycis tubo subclavato 6–7 mm. longo, basi subcylindrico 1 mm. diametro apice vix sub lobis 3–4 mm. diametro, lobis 4 inaequalibus exterioribus subrotundatis 3 mm. longis, interioribus rotundato-oblongis 5 mm. longis; petalis rotundatis circiter 7 mm. longis basi breviter unguiculatis; staminibus 3–3.5 cm. longis, antheris oblongis 1 mm. longis; stylo 3.5–4 cm. longo; fructibus ellipsoideis usque 5.5 cm. longis, 4.5 cm. diametro, apice calycis lobis coronatis, novellis breviter stipitatis, stipite crasso 5 mm. longo, 4 mm. diametro, maturis stipite nullo.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7753, September 1936, rain-forest substage (tree 15 m. high; fruit green, slightly rugose, $\pm$ 3 cm. diameter); Lower Fly River east bank opposite Sturt Island, *Brass* 8126 (TYPE), October 1936, muddy river-banks in rain-forest (small tree; flowers white, fragrant); Gaima, Lower Fly River (east bank), *Brass* 8334, November 1936, common in rain-forest substage (tree 10 m. high; fruit red, up to 5.5 cm. long, 4.5 cm. diameter).

Although neither of the numbers in fruit were collected at the same place as the flowering material, in as far as it is possible to match flowers and fruits in the herbarium, we believe the three collections represent a single species. All have the minute glandular puberulence on the new branches

and the petioles, although the branchlets of the infructescence do not show it to the same degree as when in the flowering stage. The fruit has the same kind of a glandular surface that is found in the flower.

Among New Guinea species this closely approaches *Syzygium dolichostylum* (Diels) comb. nov. (*Jambosa dolichostyla* Diels Nov. Guin. 14: 91. 1924) but the leaves in *Brass* 8126 are a little larger with a few more primary veins, the bracts of the inflorescence have already fallen, and in Diels's description there is no indication of the copious glandular puberulence which covers the branchlets of the inflorescence in this species. The latter feature suggests the Philippine *Eugenia cinnamomea* Vidal and *E. Williamsii* C. B. Robinson but the New Guinean collection is scarcely identical with either. Further, it does not seem to be *E. cinnamomea* var. *novoguineensis* Greves for in that the reticulum of the leaves is prominent on the lower surface.

Syzygium caudiferum sp. nov.

Arbor parva gracilis 8 m. alta; ramulis cinereis novellis brunnescentibus leviter compressis; foliis chartaceis crebre pellucido-punctatis in sicco supra olivaceis subtus paullo pallidioribus, lanceolato-oblongis vel anguste ellipticis, 7.5–12 cm. longis, 3–4 cm. latis, basi subacuminatis apice longe acuminatis, acumine 1–2 cm. longo angusto, costa supra impressa subtus leviter elevata, nervis primariis utrinsecus 7–10 patentibus in venam intramarginalem 4–5 mm. a margine confluentibus utrinque manifestis vix prominulis, vena intramarginali secundaria $\pm$ 1 mm. a margine disposita; petiolo vix 1 cm. longo; inflorescentiis brevissimis axillaribus terminalibusque paucifloris (usque 10-floris), rhachi 4–5 mm. longa, ramis verisimiliter nullis; floribus sessilibus subfasciculatis dense minuteque glandulosis; calycis tubo 1 cm. longo basi 4 mm. stipitato sursum 6 mm. subpyriformi, lobis 4 subrotundatis exterioribus 3 mm. interioribus 5 mm. longis, margine scariosis; petalis 5 mm. longis; staminibus 1.5–2 cm. longis; stylo usque 3.5 cm. longo; fructibus immaturis $\pm$ 2 cm. diametro.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7357 (TYPE), July 1936, alt. 100 m., river flood-plain forest sub-stage (virgate small tree 8 m. tall; flowers white; soft white turgid fruit $\pm$ 2 cm. diameter).

Apparently the fruit is quite immature. In some characters the species suggests *Eugenia coalita* Greves. However, the stamens are all distinct and the inflorescence does not appear to have lateral branches, although sometimes there will be clustered in the axil of a leaf the main inflorescence with 6–8 flowers subspicately arranged on a short peduncle, and a single flower or two on another peduncle; the inflorescences are mostly solitary rather than subfascicled.

Syzygium cinctum sp. nov.

Arbor 25 m. alta vel ultra; ramulis leviter compressis brunnescentibus; foliis chartaceis vel subcoriaceis inconspicue manifeste reticulatis pellucido-punctatis, subobovato-ellipticis, 15–21 cm. longis, paullo supra medium 6.5–10 cm. latis, apice obtusis vel retusis basi late cuneatis margine anguste revolutis, costa supra subplana subtus carinata, nervis primariis utrinsecus 18–22, supra impressis subtus prominulis inter se 0.9–1.2 cm. distantibus in venam intramarginalem confluentibus; petiolo circiter 6–8 mm. longo;

inflorescentiis terminalibus fere a basi ramosis, 6 cm. longis, 10 cm. latis, ramulis $\pm$ angulatis compressis, bracteis subrotundatis $\pm$ 2 mm. longis deciduis; floribus terminalibus apice ramulorum pedicellatis, pedicellis $\pm$ 5 mm. longis; calycis tubo subclavato 1 cm. longo, basi 2 mm. apice sub lobis 5 mm. diametro, lobis 4 rotundatis, 3 mm. longis, 4 mm. latis; petalis calyptram alte convexam formantibus caducis; staminibus numerosis, filamentis $\pm$ 1.2 cm. longis in parte inferiore in phalanges plures $\pm$ connatis, in parte superiore liberis, antheris $\pm$ 0.8 mm. longis; fructibus subovoideis calycis lobis persistentibus coronatis, circiter 1.5 cm. longis, 0.8 cm. diametro.

SOLOMON ISLANDS: Y s a b e l: Tiratona, *Brass* 3344 (TYPE), December 1932, alt. 600 m., common in mountain forests (pyramidal brown barked tree 25 m. or more tall; leaves pale with sunken nerves; flowers white; ripe fruit smooth, red).

A species readily recognized by the rather distinct and somewhat widely spaced primary venation of the leaves, the roundish bracts of the inflorescence, and the subcoalescence of the stamens showing a distinct tendency to form phalanges. The intramarginal vein is very close to the margin but not yet blended with it. It does, however, suggest an approach to the condition found in *Syzygium cartilagineum* Merr. & Perry where the intramarginal vein seems to coincide with the margin.

***Syzygium delicatulum* sp. nov.**

Arbuscula 2–3 m. alta; ramis cinereo-brunnescentibus; ramulis infra teretibus supra tetragonis brunnescentibus; foliis chartaceis pellucido-punctatis laxe reticulatis oblongo-lanceolatis, (11–)16–20 cm. longis, (2–)4–6 cm. latis, basi emarginatis vel subcordatis apice acutiusculis vel breviter acuminatis (apicibus laesis), costa supra canaliculata subtus elevata, nervis primariis utrinsecus 17–22 supra inconspicuis subtus manifestis vix prominulis in venam intramarginalem 4 mm. a margine confluentibus, interdum vena submarginali secundaria 0.5 mm. a margine remota; petiolo 2–3 mm. longo; inflorescentiis 10–13 cm. longis, 7–8 cm. latis, pedunculo 6–7 cm. longo, ramis ramosis; floribus 1–3 in apice ramulorum dispositis sessilibus; calycis tubo $\pm$ 8 mm. longo, basi longe attenuato supra elongato-turbinato, lobis 4 rotundatis, 2–3 mm. longis; petalis circiter 4 mm. longis, rotundatis basi breviter late unguiculatis; staminibus 2–2.5 cm. longis; fructibus $\pm$ 9 mm. longo, 7 mm. diametro, globoso-urceolatis basi stipitatis apice late breviter umbilicatis, calycis lobis $\pm$ fractis.

SOLOMON ISLANDS: S a n C r i s t o b a l: Waimasi, *Brass* 2781 (TYPE), August 1932, alt. 100 m., rain-forest, common (slender straggling tree 2–3 m. tall; very beautiful reddish pink flowering). G u a d a l c a n a l: Tutuve Mountain, *Kajewski* 2629, May 1931, alt. 1700 m., in poor rain-forest of higher altitudes (small tree 4–5 m. tall; fruit purple green when ripe, 9 mm. long, 7 mm. diameter).

The second collection has much more acuminate subfalcate leaves than the type but we take the two to be conspecific. Two species are here suggested as possible allies: ***Syzygium hylophilum*** (Lauterb. & K. Schum.) comb. nov. (*Jambosa hylophila* Lauterb. & K. Schum. in K. Sch. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 471. 1900), and ***Syzygium salomonense*** (Hemsl.) comb. nov. (*Eugenia salomonensis* Hemsl. Jour. Linn.

Soc. Bot. **30**: 212. 1894). From the first, *S. delicatulum* differs in having smaller flowers and double the number of primary veins in the leaves, and from the second in the very much shorter inflorescence and the narrowed elongate-turbinate calyx.

***Syzygium discolor* sp. nov.**

?Arbuscula; ramis cinereis; ramulis teretibus brunnescentibus; foliis tenuiter coriaceis impellucidis supra brunnescentibus subtus pallidioribus, oblongis, 4–7.5 cm. longis, 2–3 cm. latis, utrinque paullo angustatis basi cuneatis apice breviter obtuse acuminatis, costa subtus prominente, nervis primariis utrinsecus 9 supra leviter manifestis subtus non prominulis patentibus circiter 3 mm. a margine arcuatim conjunctis; petiolo 3–5 mm. longo; inflorescentiis usque 7 cm. longis terminalibus ramosis, ramis obscurissime puberulis; floribus saepissime pedicellatis; alabastris 1–1.3 cm. longis apice $\pm$ 7 mm. diametro; calycis tubo turbinato 6 mm. longo, stipite 2 mm. incluso, lobis 4 late rotundatis exterioribus 3 mm. interioribus 5 mm. longis; petalis circiter 8 mm. longis singillatim caducis; staminibus 2 cm. longis; fructibus non visis.

NORTHEASTERN NEW GUINEA: Sattelberg, *Clemens* 1760 (TYPE), February 1936, alt. $\pm$ 900 m.

This species seems to be a relative of *Syzygium dolichostylum* (Diels) Merr. & Perry, but the latter has larger leaves with fewer and apparently more prominent primary nerves.

***Syzygium longipes* nom. nov.**

Eugenia longipes Warburg, Bot. Jahrb. **13**: 391. 1891, K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 469. 1900; Ridley, Trans. Linn. Soc. Bot. II. **9**: 44. 1916, non Berg (1854).

Jambosa longipes Diels, Bot. Jahrb. **57**: 382. 1922.

NORTHEASTERN NEW GUINEA: Heldsbach, *Clemens* 874, November 1935, alt. $\pm$ 30 m. In addition we have the following specimens from British New Guinea which differ chiefly in having slightly larger flowers: Central Division, Kubuna, *Brass* 5606, December 1933, alt. 100 m., riverine rain-forest (tall bush about 3 m. high; branchlets 4-angled, leaves glossy; flowers red). Ridley described the stamens as 1 cm. long; in *Brass* 5606 they are about 2.5 cm. in length.

***Syzygium longipes* var. *leptopodum* (Diels) comb. nov.**

Jambosa longipes var. *leptopoda* Diels, Bot. Jahrb. **57**: 383. 1922.

BRITISH NEW GUINEA: Western Division, Fly River, 528 mile Camp, *Brass* 6708, May 1936, alt. 80 m., common in undergrowth or ridge forests (lank near-tree 3–4 m. high; stamens a deep red, other parts of the flower pink); Lake Daviumbu, Middle Fly River, *Brass* 7475, August 1936, rain-forest, the chief constituent of the wood undergrowth (small tree 3–6 m. high, producing numerous pendent panicles of showy red flowers); Central Division, Ononge Road, Dieni, *Brass* 3986, May 1933, alt. 500 m., rain-forest under storey (very slender little tree 2–3 m., inflorescence reddish); Gulf Division, Murua River, *Brass* 1345, March 1926, alt. $\pm$ 120 m., rain-forest (tall bush with dark pink flowers in terminal pendulous panicles).

The variety differs from the species in the longer branches of the inflorescence, the slightly larger flowers (calyx-tubes $\pm$ 1 cm. long), and the tendency to have leaves rounded at the base rather than cuneate.

***Syzygium Richardsonianum* sp. nov.**

Arbor usque 25 m. alta; ramorum cortice atrofusco cito decorticato; ramulis compressis vel sulcatis; foliis impellucidis novellis tenuiter maturis

rigide coriaceis in sicco supra atrofuscis subtus brunnescentibus minute glandulosis, ellipticis, 7.5–12 cm. longis, 4–8 cm. latis, basim versus sensim angustatis basi cuneatis vel obtusis apice obtusis apiculatis vel subrotundatis margine anguste recurvatis, costa supra leviter canaliculata subtus elevata, nervis primariis utrinsecus circiter 13 utrinque inconspicuis, vena intramarginali a margine 4 mm. distante disposita, venis secundariis submanifestis; petiolo $\pm$ 1.5 cm. longo; inflorescentiis terminalibus $\pm$ 12 cm. longis, 18 cm. latis, divaricatim ramosis, rhachi robusta ramis ramulisque late compressis angulatis, floribus sessilibus, alabastris 8–10 mm. longis, apice 6–7 mm. diametro, calycis tubo turbinato ruguloso (parte supra ovarium 3 mm. producta) basi prismatico subquadrangulato, lobis 4, inaequalibus rotundatis 3–4 mm. longis, cum petalis calyptratis deciduis; staminibus $\pm$ 1 cm. longis; fructibus late subglobosis, 4 cm. longis, 4.5 cm. latis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass* 11354 (TYPE), November 1938, alt. 2200 m., rain-forest, occasional on banks of river (tree 10–13 m. high; flowers cream-colored; large hard gibbose fruit); 9 km. northeast of Lake Habbema, *Brass & Versteegh* 10498, November 1938, alt. about 2700 m., rare in forest of valleys (tree 25 m. high, 27 cm. diameter; bark thick, white, smooth); *Brass* 10804, October 1938, alt. 2800 m., rare on ridges (tree attaining 25 m.; flowers cream-colored; fruit yellowish white, subglobose, $\pm$ 5 cm. diameter).

By the prismatic lower part of the flower and the broadly compressed branches of the inflorescence, this species may be allied to *Syzygium platypodum* Diels. In our material, however, the calyx-tube is distinctly longer than broad, and none of the leaves in the three collections cited are acuminate; further the dried leaves are nearer yellowish brown than of a copper color. Amongst the Malaysian material the species shows a superficial likeness to *S. palembanicum* Miq. but the leaves are thicker, more obtuse with less obvious venation, and the fruit is not ribbed. Named for Mr. W. B. Richardson, mammologist of the Expedition.

***Syzygium Roemerii* (Lauterb.) comb. nov.**

Jambosa Roemerii Lauterb. Nov. Guin. **8**: 851. 1912; Diels, Bot. Jahrb. **57**: 387. 1922.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5487, November 1933, alt. 1250 m., rare in oak forest undergrowth (small tree 6–8 m. tall; leaf-nerves impressed above, prominent beneath; flowers cream-colored).

This collection agrees reasonably well with the original description of this species except that the leaves (although injured on most tips) appear to be short- rather than long-acuminate. The collection differs from the one we have placed in *Syzygium rubellum* (Rech.) Merr. & Perry, in that the leaves are somewhat narrowed above the cordate or amplexicaul base and the lower part of the flower is slenderly stipitate rather than subcylindric.

***Syzygium rubellum* (Rech.) comb. nov.**

Jambosa rubella Rechinger, Rep. Sp. Nov. **11**: 183. 1912, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien **89**: 583, f. 25 (Bot. Zool. Ergeb. Wiss. Forsch. Samoa-I. Neug.-Arch. Salomonsins. **5**: 141). 1913.

BISMARCK ARCHIPELAGO: New Britain: Siwai, *Waterhouse* 133 (NYBG), November 1932 (small tree about 6 m. tall; pretty wax-like pinkish fruit — two or three crops in a year).

The specimen is somewhat fragmentary but it appears to be a reasonably good match for Rechinger's description and figure of this species.

E. Calyx-lobes equal, not more than 2 mm. long.

G. Inflorescence lateral.

H. Axis and branches of the inflorescence furfuraceous.

***Syzygium folidorhachis* sp. nov.**

Arbor 18 m. alta; ramis teretibus cortice atrofusco rimoso deinde caduco, ramulis leviter compressis atrofusci novellis minute glandulosis; foliis coriaceis supra manifeste subtus prominule reticulatis minute subcrebre glandulosis, ellipticis, 9–18 cm. longis, 6.5–11 cm. latis, basi breviter cuneatis decurrentibus apice obtusis vel retusis, costa supra canaliculata subtus elevata, nervis primariis numerosis fere subtransversis in venam intramarginalem crenatam 2–3 mm. a margine conjunctis, supra manifestis subtus prominulis; petiolo atrofusco 5–8 mm. longo 3 mm. crasso supra canaliculato; paniculis amplis, 10–25 cm. longis, 4–18 cm. latis, e trunco ortis plerumque divaricato-ramosis; pedunculo + 6 cm. longo, pedunculi rhachis ramorum ramulorumque cortice desquamato brunnescente; floribus non visis; fructibus immaturis sessilibus cyathiformibus vel paullo urceolatis, 7 mm. longis, 6–7 mm. latis, calycis tubo fere 2 mm. crasso supra ovarium 2.5 mm. producto, lobis caducis (uno tantum viso 2 mm. longo, 3 mm. lato).

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11917* (TYPE), January 1939, alt. 1730 m., occasional in primary forest (tree 18 m. high, 54 cm. diameter; bark dark brown, scaly; fruits brownish green, borne on the trunk). NORTHEASTERN NEW GUINEA: Ogeramnang, *Clemens 4831*, December 1936, alt. $\pm$ 2350 m.

This species like *Syzygium furfuraceum* suggests *S. Branderhorstii* Lauterb. and *S. Peckelii* Diels in the leaf-outline and the numerous veins. From the last two it may be distinguished by the scaly character of the rachis and branches of the inflorescence. In the latter feature it resembles *S. furfuraceum* but is easily separated from that by the coriaceous texture of the leaves, the more open and somewhat prominent venation, and the glandular lower surface.

***Syzygium furfuraceum* sp. nov.**

Verisimiliter arbor; ramulis compressis leviter sulcatis atrofusci; foliis chartaceis utrinque crebre reticulatis paululo prominulis in sicco supra olivaceis subtus pallidioribus, ellipticis, 11–15 cm. longis, 7–9 cm. latis, basi subrotundatis dein brevissime cuneatis paullo decurrentibus apice rotundatis vel obtusis vel obtusissime breviterque acuminatis, acumine $\pm$ 5 mm. longo latoque, costa supra impressa subtus elevata, nervis primariis numerosis patentibus vix subtransversis inconspicue manifestis in venam intramarginalem 3–4 mm. a margine conjunctis; petiolo circiter 1.5 cm. longo; inflorescentiis amplis e trunco (?) vel ramis majoribus (?) ortis ramosis, probabiliter + 20 cm. longis, ramis patentibus rhachis ramorum ramulorumque cortice cito furfuraceo-desquamato; floribus sessilibus, calycis tubo campanulato 5–6 mm. longo (parte supra ovarium 2.5–3 mm. producta), 6–7 mm. lato, inconspicue striato, lobis 4 circiter 1 mm. longis 3–4 mm. latis; petalis calyptratim caducis; staminibus numerosis, filamentis $\pm$ 1 cm. longis, antheris ovatis 1 mm. longis; fructibus ignotis.

NORTHEASTERN NEW GUINEA: Quembung, *Clemens* 2133 (TYPE), March 1936, alt. about 600 m.; Wareo, *Clemens* 1570, January 1936, alt. $\pm$ 600 m.

Among the species of *Syzygium* already described from New Guinea this probably falls in the vicinity of *S. Branderhorstii* Lauterb. and *S. Peckelii* Diels. The leaf-venation is much less obvious than in either of the latter species. Even before the flower-buds have matured, the bark begins to flake off or curl in minute particles on the axis and branches of the inflorescence causing them to appear furfuraceous. This is the conspicuous character of the species. In *Clemens* 1570 a few of the bracts of the inflorescence still persist, they are oblong, obtuse, 3–4 mm. long.

From Netherlands New Guinea, Bernhard Camp, Idenburg River, we have the following collection which either belongs here or is very closely related: *Brass & Versteegh* 13583, April 1939, alt. 450 m., occasional in primary rain-forest (tree 22 m. high, 50 cm. diameter; bark 14 mm. thick, scaly; flower-buds light green). The leaves are inconspicuously veined, very shiny above; the flower-buds are too young to suggest what might be their later development; the reddish brown axis and branches of the inflorescence are already covered with minute cortical scales.

Syzygium squamatum sp. nov.

Arbor 28 m. alta; ramis teretibus cinereo-brunnescentibus; ramulis brunnescentibus inconspicue tetragonis; foliis coriaceis consperse minuteque punctatis vel impellucidis, supra saturato-brunnescentibus subtus pallidioribus crebre inconspicueque reticulatis, oblongo-ellipticis, 5–7 cm. longis, 2.5–3 cm. latis, utrinque angustatis basi cuneatis vel acutis apice acutiusculis vel breviter obtuseque acuminatis margine anguste recurvatis, costa supra canaliculata subtus elevata, nervis primariis patentissimis numerosis in venam intramarginalem vix 1 mm. a margine confluentibus supra inconspicuis subtus manifestis, in foliis novellis prominulis; petiolo 7–8 mm. longo; inflorescentiis multifloris lateralibus a basi ramosis vel subfasciculatis, 16 cm. longis latisque, axis ramorum ramulorumque epidermide furfuraceo-exfoliata cinereo-brunnescente; floribus immaturis vernicosonitentibus.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13125 (TYPE), March 1939, alt. 850 m., frequent in primary forest of plain (tree 28 m. high, 53 cm. diameter; bark reddish brown, scaly; flower-buds green).

This is the only specimen we have described with very immature flowers, too small even to guess what they would be at anthesis; however, we believe the lateral inflorescence with grayish brown scaling-off epidermis, the 4-angled branchlets, and the close fairly clear venation of the leaves ought to be sufficient criteria to identify the species.

H. Axis and branches of the inflorescence not furfuraceous (in S. nemorale glandular-verruculose).

I. Leaf-venation open (primary veins of the leaves a little more prominent than the secondary ones).

Syzygium Brassii sp. nov.

Arbor parva; ramis cinereis, ramulis tenuiter compressis fulvis; foliis tenuiter coriaceis impellucidis in sicco brunnescentibus inconspicue laxequae

reticulatis lanceolato-oblongis, 10–23 cm. longis, 3–4.5 cm. latis, basi cuneato-acutis vel breviter acuminatis, apice sensim attenuatis, costa supra impressa subtus prominula, nervis primariis utrinsecus $\pm$ 20 patentibus, in venam intramarginalem 2–3 mm. a margine distantem confluentibus, supra subobscuris subtus manifestis, basim versus cum secundariis fere aequaliter inconspicuis; petiolo 1.5–2 cm. longo atrofusco apicem prope brunnescente; inflorescentiis e nodis defoliatis ortis, usque 15 cm. longis, 10 cm. latis, a basi ramosis multifloris, ramis ad nodos compressis, ramulis leviter compressis; floribus sessilibus, bracteis plerumque caducis, calycis tubo 4–5.5 mm. longo, globoso-urceolato interdum basi brevissime (usque 1 mm.) stipitato, sub lobis leviter constricto minute glanduloso, in sicco ruguloso, lobis 4 subaequalibus circiter 1.5 mm. longis, 2.5 mm. latis; petalis calyptratim caducis; staminibus 5–7 mm. longis, antheris 0.5 mm. longis; fructibus ignotis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7682 (TYPE), September 1939, rain forest (small canopy tree; branchlets weak; petals and calyx-lobes pink; stamens green).

The best characters of this species are the lateral inflorescence, the slender branchlets with narrow, long-petiolate leaves and the globose-urceolate calyx of the flowers.

Syzygium cornifolium (Blume) comb. nov.

Jambosa cornifolia Bl. Mus. Bot. Lugd.-Bat. **1**: 92. 1849; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 470. 1900; Diels, Bot. Jahrb. **57**: 388. 1922.

Eugenia cornifolia (Bl.) K. Schum. & Hollr. Fl. Kaiser Wilhelms Land 89. 1889; Warb. Bot. Jahrb. **13**: 389. 1891; K. Schum. Notizbl. Bot. Gart. Berl. **2**: 137. 1898.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5772, January 1934, common on banks of tidally influenced river (low tree overhanging the water; bright brown flaky bark; yellowish dull leaves; soft pink fruit $\pm$ 1 cm. diameter); Kanosia, *Carr* 11314, February 1935, marshy forest (tree about 15 m. tall; fruit very dark red, almost black).

We have hesitated for some time over this determination. We lack authentic material of both ***Syzygium platycarpum*** (Diels) comb. nov. (*Jambosa platycarpa* Diels, Bot. Jahrb. **57**: 385. 1922) and *S. cornifolium* for comparison. The collections seem to fit better the description of the latter; on the other hand another collection, *Brass* 1148, determined by Diels as representing *J. platycarpa* Diels vel aff. (indicating a doubtful determination) seems to us to be conspecific with those cited above. Like so many other collections we have at hand, the determinations can be made only tentatively until the types are accessible.

Syzygium flavescens (Ridl.) comb. nov.

Eugenia flavescens Ridl. Trans. Linn. Soc. Bot. II. **9**: 46. 1916.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7659, September 1936, rain-forest along the lake (tree 5–6 m. high with thick bole, spreading low over the water; bark thin, grey-brown, exfoliating in hard flakes; flowers pink; fruit purple-black, $\pm$ 5 mm. long); *Brass* 7954, rain-forest, restricted to shores of the lake (conspicuous and characteristic tree attaining 25 m.; trunk narrowly flanged or fluted at base; bark grey, exfoliating in large thick flaky scales; flower-buds white; young fruit red).

Although the type of this species came from Netherlands New Guinea at about 900 m. alt., the material from Lake Daviumbu appears to represent

Ridley's species as interpreted from his description and the photograph of his type.

Syzygium kietanum Rechinger Rep. Sp. Nov. 11: 183. 1912, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien 89: 585 (Bot. Zool. Ergeb. Wiss. Forsch. Samoa-I. Neug.-Arch. Salomonsins. 5: 143). 1913.

SOLOMON ISLANDS: Bougainville: Kieta, Waterhouse 207 (NYBG), February 1933, beach tree yielding tough reddish timber. Ysabel: Jaukau, Brass 3150, November 1932, steep foreshores, common (tree 25 m. tall, with bumpy corrugated trunk and main branches; pale brown bark falling in long thick flat scales; leaves shining [dull when dry]; flowers white, very numerous on trunk and main branches).

Although Rechinger compares this species with *Syzygium corynocarpum* (A. Gray) C. Muell., we cannot pass over this material, a perfect match for his description, without pointing out the very close resemblance between these collections and *S. clusiaefolium* (A. Gray) C. Muell. The only difference we can see is that the flowers of the Solomon Islands material are very slightly longer. However, since only very scanty material is at hand, we are maintaining both as species for the present.

It is interesting to note that *Syzygium clusiaefolium* (A. Gray) C. Muell. is included in the "List of plants collected in the islands of Bougainville Straits, Solomon Group, during 1884," taken from Guppy, The Solomon Islands and their Natives 297. 1887.

Syzygium megistophyllum sp. nov.

Arbor gracilis 7 m. alta; ramulis teretibus brunnescentibus; foliis coriaceis sessilibus vel subsessilibus, in sicco supra brunnescentibus subtus pallidioribus sublanceolatis, 52-87 cm. longis, 15-34 cm. latis, basi valde cordatis apice (fractis) verisimiliter acuminatis, costa supra subplana subtus elevata, nervis primariis utrinsecus 40-60 patenti-adscendentibus subparallelis in venam intramarginalem $\pm$ 5 mm. a margine distantem conjunctis supra insculptis subtus prominentibus, venis secundariis manifestis oblique clathratis; inflorescentiis e trunco inferiore ortis, rhachi 9 cm. longa, ramis usque 1.5 cm. longis; floribus non visis; fructibus sessilibus, in sicco lageniformibus 4.5 cm. longis (parte inferiore ellipsoidea 3 cm. longa 2 cm. lata, subabrupte in parte superiore umbilicata 1 cm. longa $\pm$ 8 mm. diametro angustata), calycis lobis non visis.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, Brass 13340 (TYPE), March 1939, alt. 900 m., occasional in *Agathis* forest (slender little branched tree $\pm$ 7 m. high; fruit red, soft and pithy, subglobose, up to 7.5 cm. diameter, clustered on the lower stem less than 1 m. from the ground).

It has been difficult to determine whether this is a new species or whether it belongs to either *Syzygium Schlechteri* Diels or *S. recurvo-venosum* (Lauterb.) Diels. Diels himself pointed out the similarity in the two species but, lacking sufficient material, was unable to decide whether they were really separable or not. Our material differs from *S. Schlechteri* Diels in the terete branchlets and the deeply cordate rather than obtusely emarginate leaves. The fruit is not at all stipitate as is the flower of *S. Schlechteri* Diels. On the other hand, it is not pyriform as that described for *S. recurvo-venosum* (Lauterb.) Diels. It is to be noted also that the dried fruit in shape is unlike the fresh or pickled fruit.

Syzygium nemorale sp. nov.

Arbor parva; ramis cinereo-brunnescentibus; ramulis teretibus vel sulcatis brunnescentibus; foliis chartaceis vel tenuiter coriaceis impellucidis inconspicue laxe reticulatis, ovato-ellipticis vel oblongo-ellipticis, 18–21 cm. longis, 9–10 cm. latis, basi rotundatis vel emarginatis apice breviter acuminatis, costa supra canaliculata subtus prominente, nervis primariis utrinsecus $\pm$ 9 arcuatim conjunctis infimis interdum liberis prope marginem adscendentibus; petiolo 5–8 mm. longo; paniculis probabiliter lateralibus vel nodis defoliatis ortis, 7–10 cm. longis latisque; ramis ramulisque divaricatis crebre glanduloso-verruculosis; floribus 1–3 apice ramulorum sessilibus basi minute bracteatis, bracteis caducis; calycis tubo turbinato 4–5 mm. longo stipite circiter 2 mm. incluso, margine truncato; petalis calyptratim caducis; staminibus 5–7 mm. longis; fructibus immaturis.

SOLOMON ISLANDS: *Ysabel*: Sigana, *Brass* 3456 (TYPE), January 1933, alt. 100 m., hill rain-forests (small creek bank tree; leaves with dark green nerves; flowers white). *Guadalcanal*: Mamassa, Konga, *Kajewski* 2481, February 1931, alt. 400 m., riverbanks in rain forest (medium sized tree up to 20 m. high; fruit immature).

Syzygium triphlebium Diels also has an inflorescence with verruculose branchlets, but the flowers are much smaller than in this species and the inflorescences would seem to be lateral. One is attached to the older growth, the others are all separate.

Syzygium pyrocarpum (Greves) comb. nov.

Eugenia pyrocarpa Greves, Jour. Bot. **61**: Suppl. 17. 1923.

In the material borrowed from the New York Botanical Garden is the following collection: *Carr* 12767, Koitaki, Papua. The specimen either belongs here or is a strong affinity of the species; it differs from the description in the obvious secondary venation and the wingless petioles. In these two characters it more closely approaches *Syzygium xylanthum* (Greves) comb. nov. (*Eugenia xylantha* Greves, Jour. Bot. **61**: Suppl. 18. 1923) but the primary veins are much more numerous and the inflorescence is short and compact.

I. Leaf-venation close (primary and secondary veins scarcely distinguishable from each other).

Syzygium acetosum sp. nov.

Arbor magna usque 25 m. alta; ramulis leviter compressis brunnescentibus; foliis chartaceis vel tenuiter coriaceis pellucido-punctatis reticulatis, ellipticis vel late lanceolatis, 12–18 cm. longis, 5.5–9 cm. latis, utrinque aequaliter angustatis basi cuneatis apice anguste obtusis vix acuminatis, costa supra impressa subtus prominula, nervis primariis secundariisque subaequaliter manifestis numerosis patentibus utrinque distinctis, vena intramarginali vix 2 mm. a margine disposita; petiolo 1–1.5 cm. longo 2 mm. lato atrofusco supra canaliculato; inflorescentiis e trunco ortis; floribus non visis, in fructu pedunculo usque 8 cm. ac rhachi usque 10 cm. longis vel brevioribus; cortice interdum rimoso, ramis divaricatis 6–2 cm. longis; fructibus in sicco pyriformibus 3.5 cm. longis, 2.5 cm. latis, immaturis subturbinatis 3 cm. longis, 1.8 cm. latis, apice calycis lobis 4 coronatis umbilicatis, umbilico 3–4 mm. profundo; calycis lobis 1 mm. longis 3–4 mm. latis.

BRITISH NEW GUINEA: Western Division, Daru Island, *Brass* 6267 (TYPE), March

1936, light rain-forest (handsome tree up to 25 m. tall; bark brown, corky, flaky; numerous short panicles borne in scattered clusters up the trunk; fruit of a pleasantly acid flavor, dull red, white inside, $\pm$ 4.5–5 cm. long, 3.5 cm. diameter but variable as to size and shape on different trees; flowers not seen).

The closely veined lanceolate obtusish leaves and the lateral inflorescences are the best characters of this species. The somewhat turbinate younger fruit suggests a rather long clavate or elongate turbinate flower, possibly one something like that described in *Syzygium pyrrophloeum* Diels from the Bismarck Archipelago. We are unable to suggest any closer alliance of this species.

***Syzygium badium* sp. nov.**

Arbor 27 m. alta; ramis decorticatis; ramulis atrofusis 4-angulatis; foliis coriaceis supra atrofusis subtus brunnescentibus subobscure reticulatis, novellis pellucido-punctatis, vetustioribus $\pm$ impellucidis, ellipticis, 3.5–6.5 cm. longis, 1.3–3 cm. latis, basi cuneatis vel acutis apice breviter obtuseque acuminatis vel subobtusis margine vix recurvatis, costa supra canaliculata subtus prominula, nervis numerosis patentibus inconspicuis, vena intramarginali circiter 0.5 mm. a margine remota vix manifestis; petiolo 3–4 mm. longo atrofusco supra canaliculato; inflorescentiis laterilibus (?), in specimine typico a basi ramosis $\pm$ 13 cm. longo; floribus non visis; fructibus solitariis apice ramulorum (2–3 mm. longorum) immaturis 9 mm. longis (basim includentibus 3 mm. stipitatis), parte superiore campanulata 7 mm. diametro, maturis late globoso-urceolatis basi brevius stipitatis, circiter 1.5 cm. diametro, apice umbilicatis, umbilico 6–7 mm. lato, 2 mm. longo; calycis lobis non visis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11992* (TYPE), February 1939, alt. 2200 m., frequent on slopes in primary forest (tree 27 m. high, 39 cm. diameter; bark 6 mm. thick, brown; young fruit light green, mature red).

In this collection all the infructescences are separate from the foliar specimens which leads us to believe that the inflorescence is lateral; unfortunately none of them show the attachment at the base. In Diels's treatment of *Syzygium* the collection seems to be nearest to *S. petraeum* Diels; this, according to his key has 4-angled branchlets and terminal and axillary bracteate inflorescences. The description of the leaves fits our collection fairly well except that here the veins on both surfaces are visible to the naked eye appearing as fine lines with close and inconspicuous reticulations. Most of the fruit is mature.

***Syzygium decipiens* (Koord. & Val.) comb. nov.**

Eugenia decipiens Koord. & Val. Meded. Lands Plant. **40**: 131 (Bijdr. Boomsoort. Java **6**: 131). 1900; Atlas Baumart. Java **3**: t. 495. 1915.

SOLOMON ISLANDS: Guadalcanal: basin of Sorvorhio River, *Kajewski 2695*, January 1932, alt. about 100 m., common in rain-forest (medium sized tree up to 25 m. high with small buttresses; bark brownish grey shedding in flakes; fruit brown-red when ripe, depressed-globular, 9 mm. long, 12 mm. diameter).

Although we have no material of this species from Java for comparison, this is a very good match for a Philippine collection so named. As far as fruit, leaf-outline and venation are concerned, the collection suits that of the plate cited above.

***Syzygium leptophlebioides* sp. nov.**

Arbor; ramulis fulvo-brunnescentibus, novellis leviter compressis; foliis coriaceis, in sicco supra atro-olivaceis subtus leviter pallidioribus, crebre minuteque pellucido-punctatis vel semi-impellucidis, ellipticis, 9–14 cm. longis, 4–5.5 cm. latis, utrinque angustatis basi cuneatis apice breviter obtuseque acuminatis, acumine $\pm$ 1 cm. longo, margine planis, costa supra canaliculata subtus leviter elevata, nervis primariis secundariisque numerosis fere aequaliter manifestis supra inconspicuis subtus distinctis, vena intramarginali 1 mm. a margine remota; petiolo $\pm$ 1.3 cm. longo; inflorescentiis caulifloris interdum terminalibus axillaribusque divaricatis ramosis in specimine typico 24 cm. longis, 18 cm. latis, rhachi 7 mm. ramis 5 mm. diametro, ramulis ultimis late compressis; floribus sessilibus vel interdum brevissime pedicellatis; calycis tubo infero 1.5 mm. crasso-substipitato subangulato, supero 5 mm. subcampanulato in sicco longitudinaliter ruguloso, apice 4–5 mm. diametro, lobis 4 circiter 1–1.5 mm. longis, obtusiusculis; petalis calyptratis caducis; staminibus $\pm$ 7 mm. longis; fructibus ignotis.

NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8979 (TYPE), July 1938, alt. 100 m., one of the very common second layer trees in the rain-forest (bark pale brown shedding in hard thick flakes; inflorescence cauliflorous; calyx pink; stamen cream-colored); hill north of Hollandia, *Neth. Ind. For. Service* bb. 25055, July 4, 1938, alt. 50 m.

We have hesitated for some time before describing this material on account of having at hand the collections *Drs. v. Leeuwen* 9491, 11191, named *Syzygium leptophlebium* Diels; these, in spite of a terminal inflorescence in one, appear to be very closely related to our species, in fact so closely related that we are uncertain whether they are conspecific or not. However, until we can examine Diels's type, it is necessary to accept his description of the species "flores 5-meri" rather than the tentative identification of the numbers above mentioned (in which the flowers have a distinctly 4-lobed calyx). *Drs. v. Leeuwen*'s material differs from that here described in having a calyx-tube with a little shorter base, somewhat less rugulose when dry, and more rounded calyx-lobes, and a terminal inflorescence. The leaves are almost a coppery brown and the minute glands are less obvious. We doubt that these are specific differences. The difference between *S. platypodum* Diels and our species is harder to define, since a cauliflorous tree sometimes has terminal inflorescence; nevertheless, the former is characterized as a shrub with flowers 5–6 mm. long, 6–7 mm. broad, but without any indication as to whether the flowers are 4-merous or 5-merous. In our species the flowers are longer than broad and narrowed at the base into a short thick $\pm$ angled stipe.

***Syzygium rectangulare* sp. nov.**

Arbor usque 20 m. alta; ramis cinereis, ramulis brunnescentibus compressis, novellis sulcatis; foliis chartaceis crebre pellucido-punctatis, in sicco olivaceis, ellipticis, 7–14 cm. longis, 3–5.5 cm. latis, utrinque angustatis basi obtusis vel cuneatis apice acuminatis, costa supra canaliculata subtus prominula, nervis primariis numerosis tenuibus subparallelis late patentibus utrinque inconspicuis; petiolo 5–7 mm. longo; inflorescentiis e nodis defoliatis ortis $\pm$ 15 cm. longis latisque, pedunculis 2–4 cm. longis, ramis divaricatis compressis subangulatis; floribus apice ramulorum ultimorum sessilibus vel subsessilibus solitariis vel cymosis; calycis tubo turbinato-

obconico basi subangulato, 3 mm. longo (incl. partem 1.5 mm. supra ovarium productam) latoque, margine undulato vel obsolete 4-lobato; petalis calyptratis caducis; staminibus circiter 5 mm. longis; fructibus facie quoad visis subrectangularibus $\pm$ 1 cm. [inter apicem basemque] longis, 1.1–2 cm. latis.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13930 (TYPE), 14056, April 1939, alt. 50 m., the characteristic fringe tree of flooded rain-forests of the river plain (tree up to 20 m. high, 50 cm. diameter profusely branched and leaning over the water; bark reddish brown and somewhat flaky; flowers pink with white stamens; fruit a glaucous purple, 4-angled).

Amongst the descriptions of New Guinean species *Syzygium rectangulare* appears to be most like that of *S. megalanthelium* Diels. The leaves cannot well be separated by the descriptions but the inflorescence of our species is much smaller and the flowers are angular rather than cylindric at the base; the latter feature is emphasized in the pulvinate obtusely 4-angled fruits. The species is easily recognized by the lateral profusely small-flowered inflorescences and the somewhat flattened angular fruits.

Syzygium rosaceum Diels, Bot. Jahrb. 57: 406. 1922.

BRITISH NEW GUINEA: Oroville Camp, Fly River, *Brass* 7423, August 1936, rain-forest canopy (large tree; young fruit pink); Lake Daviumbu, Middle Fly River, *Brass* 7683, September 1936, rain-forests (common canopy tree; stem spur-buttressed, covered with thick flaky reddish brown bark; calyx waxy cream-color; petals and stamens pink); Central Division, Ononge Road, Dieni, *Brass* 3922, May 1933, alt. 700 m., rain-forest (tree 30 m., of erect branching habit; bright brown bark shedding in thin papery flakes; upper surface of leaves shining; calyx white; petals red; stamens very pale pink).

These collections answer to the description of *Syzygium rosaceum* Diels from Northeastern New Guinea except that the leaves are a little larger (7–10 cm. long, 2.5–4 cm. broad). It is to be noted that our specimens show terminal, axillary and lateral inflorescences tending, however, to be predominantly lateral.

G. Inflorescence terminal and axillary.

K. Branchlets 4-angled (cf. also *S. effusum* (A. Gray) C. Muell.)

Syzygium Doctersii sp. nov.

Frutex vel arbor; ramis teretibus cortice $\pm$ desquamato; ramulis tetragonis atro-brunnescentibus; foliis parvis valde coriaceis impellucidis, supra atro-olivaceis vel brunneo-olivaceis subtus pallide brunnescentibus, obovatis, 2.2–3 cm. longis, 1.2–1.8 cm. latis, basi cuneatis apice rotundatis vel obtusis vel emarginatis, costa supra canaliculata subtus leviter elevata, nervis primariis supra obscuris subtus inconspicuis paene obscuris quapropter lamina subtus primo intuitu nempe leviter striata; petiolo 2 mm. longo atrofusco; inflorescentiis terminalibus vel in axillis foliorum superiorum dispositis, 4–6 cm. longis, a basi ramosis, ramis valde tetragonis pallide brunnescentibus; floribus sessilibus vel breviter pedicellatis; calycis tubo 3–3.5 mm. longo, turbinato basi stipitato, lobis 4 aequalibus obtusiusculis 0.5 mm. longis; petalis calyptratis caducis; staminibus 3 mm. longis; stylo 3–4 mm. longo; fructibus ignotis.

NETHERLANDS NEW GUINEA: Rouffaer Rivier, Zijrivier, *Docters v. Leeuwen* 10423 (TYPE).

This collection was distributed under the name of *Syzygium arfakense* (Gibbs) Diels. It differs from the original description of that species in the sharply four-angled branchlets, the cymose branching of the inflorescence, the shorter petioles, and the shorter stamens.

Syzygium leptoneurum Diels, Bot. Jahrb. **57**: 407. 1922.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5583, November 1933, alt. 100 m., gravelly river bottom (small horizontally branched tree 4-5 m. high; flowers white; fruit immature; trees mostly in young bud); Kanosia, *Carr* 11356, February 1935, banks and islands in rivers (shrub $\pm$ 2.5 m. high; flowers white).

As far as can be determined from the description, our plants are identical with this species. The dried short-stipitate fruits of *Brass* 5583 are subglobose and about 8 mm. in diameter.

Syzygium leptopodium sp. nov.

Frutex vel arbor parva; ramis teretibus cinereo-brunnescentibus; ramulis tetragonis brunnescentibus; foliis chartaceis vel tenuiter coriaceis in sicco supra olivaceis subtus pallidioribus inconspicue reticulatis, lanceolatis vel ovatis, 3.5-6.5 cm. longis, 1.3-2.8 cm. latis, basi rotundato-cuneatis vel breviter cuneatis interdum fere rotundatis, apice obtuse (interdum acutiuscule) breviter acuminatis, margine paullo recurvatis, costa supra impressa subtus prominula, nervis primariis utrinsecus 13-19 subtransversis in venam intramarginalem circiter 1 mm. a margine confluentibus supra inconspicuis subtus manifestis; petiolo 1-2 mm. longo; inflorescentiis axillaribus terminalibusque paucifloris, rhachi plerumque 1-1.5 cm. longa tetragona; floribus sessilibus; alabastris $\pm$ 13 mm. longis, anguste clavato-turbinatis, parte inferiore (clavata) circiter 1 cm. longa, parte superiore ampliata $\pm$ 3 mm. diametro; petalis cito calyptratim caducis; staminibus numerosis usque 5 mm. longis; fructibus in sicco pyriformibus $\pm$ 1 cm. longis.

NORTHEASTERN NEW GUINEA: Ogeramnang, *Clemens* 4526, 5056, 5119a, 5326 (TYPE), December-February 1937, alt. 1750-1800 m., in forest hills (small tree or shrub with white flowers and very dark fruit); Yunzaing, *Clemens* 3951, August 1936, alt. 1650 m., mountain forest (shrub with white flowers and dark fruit).

This species is related to *Syzygium leptanthum* (Wight) Niedenzu but has smaller leaves with a different outline. The flower coincides fairly well with the description of that of *S. heloanthum* Diels but the inflorescence is characteristically short; further, we are inclined to believe that leaves characterized as having numerous nerves would have a closer venation than appears in our species.

Syzygium maschalocladum sp. nov.

Arbor usque 20 m. alta; ramis $\pm$ decorticatis; ramulis novellis manifeste quadri-alatis brunnescentibus; foliis pellucido-punctatis, in sicco supra atro-brunneis subtus pallide olivaceis crebre reticulatis minute glandulosis, oblongis vel oblanceolatis, 7-12 cm. longis, 3-4.5 cm. latis, basi anguste cuneatis vel acutis, apice subabrupte breviter acuminatis, acumine 5-10 mm. longo obtusiusculo, margine anguste recurvatis, costa supra canaliculata subtus elevata crebre glandulosa, nervis primariis numerosis inter se circiter 2 mm. distantibus patenti-adscendentibus, interdum furcatis, in venam intramarginalem vix 2 mm. a margine confluentibus, supra manifestis subtus prominulis; petiolo $\pm$ 5 mm. longo supra canaliculato; in-

florescentiis 2-3-fasciculatis usque 8 cm. longis, 13 cm. latis, in ramis hornotinis vel annotinis terminalibus, a basi ramosis, ramis subdivaricatis, rhachi anguste 4-alata, ramulis compressis tetragonis; floribus non visis; fructibus sessilibus apice ramulorum cymosis, 4-5 mm. longis, immaturis, globoso-pyriformibus, calycis lobis 5 brevibus coronatis, crebre minuteque glandulosis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11909* (TYPE), *Brass 12144*, January 1939, alt. 1740 m. and 1800 m., occasional subsidiary tree in rain-forest of slopes (tree 15-20 m. high; bark brown, scaly; fruit red-brown, [in the second collection cited] purple).

This species approaches both *Syzygium scytophyllum* Diels and *S. tacniatum* Diels judging by their descriptions. It differs from the second in having panicles divaricately branching from the base (not long pedunculate nor with strict branches), and 5 calyx-lobes; it may be distinguished from the first by its more obvious leaf-venation. What the character of the branchlets is in *S. scytophyllum* Diels we could not discover either in the key to the genus or in the original description. In our species the winged branchlets are very obvious.

K. Branchlets terete or sulcate, not angled.

L. Leaves subsessile, cordate or emarginate at base.

***Syzygium camptodromum* sp. nov.**

Frutex magnus vel arbor parva; ramulis teretibus cortice atrofusco rimoso atque in squamis parvis secedente; foliis tenuiter coriaceis, in sicco brunnescentibus inconspicue reticulatis oblongo-lanceolatis, $\pm$ 37 cm. longis 13 cm. latis, basi cordatis, apice (summo fracto) acutis vel acuminatis(?), costa supra paullo elevata leviter canaliculata subtus prominula, nervis primariis utrinsecus 18-20 subirregulariter dispositis oblique patentibus in venam intramarginalem arcuatam prominulam $\pm$ 1.5 cm. a margine distantem confluentibus, vena intramarginali secundaria (interdum extus tertia) cum primaria subparallela manifesta circiter 4 mm. a margine disposita; petiolo vix 5 mm. longo atrofusco basi folii tecto; panicula terminali, $\pm$ 11 cm. longa, axi brunnescente, ramis (inferiore) 7-(superiore) 2 cm. longis, patentibus; floribus non visis, verisimiliter clavatis; fructibus $\pm$ 2.5 cm. longis, 1 cm. diametro, parte inferiore pyriformi circiter 2 cm. longa, calycis tubo $\pm$ 7 mm. longo 5 mm. diametro coronata.

SOLOMON ISLANDS: *Y s a b e l*: Sigana, *Brass 3528* (TYPE), January 1933, coastal rain-forests (large stiffly branched shrub or small tree).

A very distinct species with large cordate openly veined leaves and relatively short inflorescence.

***Syzygium subamplexicaule* sp. nov.**

Arbuscula 2.5 m. alta; ramulis brunnescentibus vix compressis; foliis chartaceis crebre minuteque pellucido-punctatis, in sicco olivaceis vel viridescentibus laxè reticulatis lanceolato-oblongis, 22-27 cm. longis, 5-9 cm. latis, basi cordatis vel emarginatis apice acuminatis, acumine 2-2.5 cm. longo, costa supra leviter canaliculata subtus elevata, nervis primariis subirregularibus utrinsecus circiter 22 late patentibus supra manifestis subtus prominulis, secundariis cum primariis subparallelis fere aequaliter prominulis; petiolo crasso circiter 3 mm. longo; inflorescentiis terminalibus brevissimis a basi breviter ramosis, rhachi $\pm$ 1 cm. longa valde com-

pressa; floribus apice ramorum cymosis vel solitariis sessilibus gracillime clavatis creberrime glandulosis; calycis tubo circiter 16 mm. longo, basi 0.5 mm. apice 2–2.5 mm. diametro, lobis 4 circiter 1 mm. longis; staminibus 4–6 mm. longis, antheris minutis; fructibus oblongo-ovoideis basi stipitatis, 1.7 cm. longis (incl. 4 mm. stipitem), 0.6 cm. diametro, striato-rugulosis dense glandulosis; semine oblongo, cotyledonibus glandulosis.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8218 (TYPE), October 1936, rain-forest (undergrowth near-tree 2.5 m. high; fruit pink—a few dried flowers amongst fruit).

This species suggests *Syzygium novo-guineense* nom. nov. (*Jambosa auriculata* Blume Mus. Bot. Lugd.-Bat. 1: 104. 1849, which was based on the herbarium name *Myrtus auriculata* Zipp.), but it differs in many points from the description of that species. The leaves are copiously pellucid-punctate, the flower is so very slender that it could not be called turbinate, the lobes of the calyx are very small and of about equal size, from the fullness of the seed the fruit appears to be about mature and it is very much smaller than that of Blume's species; hence, we have decided that the resemblance is mostly in the leaf-outline. The fruit is similar in appearance and structure to a small fruit of *Syzygium claviflorum* (Roxb.) A. M. & J. M. Cowan. The specific name *auriculatum* has already been used for a New Caledonian species.

L. Leaves petiolate.

M. Leaves with open venation (primary veins more obvious than the secondary except possibly in S. cartilagineum).

***Syzygium bicolor* sp. nov.**

Arbor magna; ramulis compressis vel subangulatis brunnescentibus; foliis coriaceis impellucidis opacis, supra olivaceis subtus subcinnamomeis inconspicue reticulatis, ellipticis, 3–4.5 cm. longis, 1–1.7 cm. latis, utrinque aequaliter angustatis basi cuneatis apice acutiusculis, costa supra impressa subtus prominula, nervis primariis utrinque 4–6 subadscendentibus in venam intramarginalem 2–3 mm. a margine confluentibus supra leviter insculptis subtus subprominulis; petiolo $\pm$ 4 mm. longo nigrescente supra canaliculato; inflorescentiis terminalibus atque in axillis foliorum superiorum dispositis, rhachi plerumque usque 1.5 cm. longa ramisque argute tetragonis vel anguste alatis; alabastris clavatis, basi 2 mm. stipitatis, $\pm$ 11 mm. longis; calycis tubo minute ruguloso vel vermiculari-ruguloso, 9 mm. longo, basi 1 mm. crasso, sub lobis 4 mm. diametro, lobis 5 vix 1 mm. longis subtruncatis; petalis singillatim vel calyptratim deciduis; staminibus 5–7 mm. longis; fructibus ignotis.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13018 (TYPE), March 1939, alt. 1200 m., rain-forest (frequent large tree rising above forest canopy layer; bark flaky, reddish brown; flowers white).

The flowers of this species show some resemblance to those of *Syzygium zeylanicum* (L.) DC. but they are more evenly clavate with a less marked stipe. Among Papuan species the collection seems nearer the description of *Syzygium combretiflorum* (Diels) comb. nov. (*Jambosa combretiflora* Diels, Bot. Jahrb. 57: 392. 1922) than any other, but in the latter the leaves are long-acuminate and the calyx-tube about 4 mm. long.

Syzygium bicolor is readily recognized by the small leaves and the very finely rugulose calyx.

***Syzygium cartilagineum* sp. nov.**

Arbor parva; ramulis levibus pallide brunnescentibus; foliis coriaceis, in sicco supra olivaceis subtus paullo pallidioribus crebre minuteque pellucido-punctatis utrinque reticulatis, obovatis, 21–22 cm. longis, 10.5–13 cm. latis, apice rotundatis basi cuneatis leviter obliquis, margine induratis crassiusculis cartilagineis, costa supra plana vel basim versus paullo elevata subtus carinata, nervis primariis numerosis late patentibus inter se 4–5 mm. distantibus marginem attingentibus utrinque distinctis, vena intramarginali nulla; petiolo 3.5–4 cm. longo leviter carinato; inflorescentiis pluri-ramosis multifloris subcorymbosis pseudoterminalibus, 14 cm. longis, 20 cm. latis, ramis ramulis late compressis 4-angulatis; alabastris apice ramulorum ultimorum pedicellatis vel interdum sessilibus, obovoideo-oblongis, 8 mm. longis, 5 mm. latis; calycis lobis 4 brevibus, floribus in anthesi non visis.

SOLOMON ISLANDS: S a n C r i s t o b a l : Hinuahaoro, *Brass* 3062 (TYPE), September 1932, alt. 900 m., mountain rain-forests (small tree; leaves stiff and shining).

This species is well marked by foliar characters: the midrib on the lower surface and the petiole are keeled; the primary veins, instead of either fading out near the margin of the blade or anastomosing to form or join a submarginal vein, extend from the midrib to the rather thick indurated cartilaginous margin of the leaves. In other words, the intramarginal vein has merged with the margin of the leaf resulting in the thick margin here represented. This is an unusual character in the genus; unfortunately mature fruit and full grown flowers are lacking, but in the structure of the immature flower-buds we have no characters which would exclude the collection from *Syzygium*.

***Syzygium capituliferum* sp. nov.**

Arbor 5–6 m. alta; ramis atro-cinereis; ramulis compressis brunnescentibus; foliis coriaceis impellucidis supra levibus brunnescentibus subtus pallidioribus manifeste laxe reticulatis, ellipticis vel oblongis, (3–)4.5–8 cm. longis, 1.7–4.5 cm. latis, basi obtusis vel obtuse cuneatis, apice obtusis vel rotundatis, margine interdum paullo recurvis saepe planis, costa supra vix impressa subtus prominula, venis primariis supra inconspicuis subtus prominulis, infimis longe adscendentibus, caeteris patenti-adscendentibus arcubus 5–6 intramarginalibus a margine 5 mm. remotis conjunctis; petiolo 6–7 mm. longo nigrescente; inflorescentiis terminalibus axillaribusque multifloris, rhachi brevissima, floribus glomeratis; calycis tubo circiter 4 mm. longo, in sicco ruguloso, lobis 5 minimis; petalis circiter 2 mm. diametro calyptratim deciduis; staminibus $\pm$ 5 mm. longis; fructibus ignotis.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tumbuke, *Brass* 8482 (TYPE), December 1936, common in rain-forest along streams (tree 5–6 m. high; leaves thick-coriaceous, margins narrowly recurved, veins prominent beneath; flowers white).

A very distinct species easily recognized at a glance by the unusual leaf-venation and the very short inflorescences. The flowers are crowded into small compact clusters scarcely longer than the petiole subtending them; the lower primary veins (2 or 3 or sometimes 4) tend to appear elongated as intramarginal veins (connected by the reticulum of the secondary vena-

tion) ascending toward the apex of the leaf rather than emerging from the midrib and becoming confluent with the submarginal vein as is the case in a large number of species of *Syzygium*.

***Syzygium japonense* sp. nov.**

?Arbor; ramulis teretibus epidermide tenuissima squamoso-exfoliata, novellis compressis leviter sulcatis; foliis tenuiter coriaceis impellucidis obscure reticulatis, ovatis vel lanceolatis, (3–)6–8 cm. longis, (1–)2–4.5 cm. latis, basi breviter cuneatis apice sursum $\pm$ angustatis obscure acuminatis obtusiusculis vel acutis, costa supra plana subtus prominente, nervis primariis patenti-adscendentibus utrinsecus $\pm$ 10 supra leviter impressis subtus manifestis non prominulis in venam intramarginalem 1.5–2 mm. a margine confluentibus; petiolo $\pm$ 5 mm. longo; inflorescentiis terminalibus vel axillaribus a basi ramosis vel pedunculatis, 8 cm. longis, circiter 13 cm. latis, ramulis subteretibus; floribus sessilibus, alabastris 7 mm. longis, apice 2–2.5 mm. diametro, parte inferiore cylindrica basi leviter angustata superiore obovoidea; calycis tubo 4–5 mm. longo, margine 4-dentato; petalis calyptratum caducis; staminibus $\pm$ 5 mm. longis; fructibus ignotis.

NETHERLANDS NEW GUINEA: Japan Island, Seroei, *Neth. Ind. For. Service* bb 30584 (TYPE), September 1939, alt. 5 m.

Among New Guinean species this is closest to *Syzygium modestum* Diels, but the leaves are smaller and not markedly acuminate, and the venation is inconspicuous.

***Syzygium Lorentzianum* Lauterb. Nov. Guin. 8: 852. 1912; Diels, Bot. Jahrb. 57: 402. 1922.**

NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8864, June 1938, alt. 20 m., common in open second growths on a rocky slope (bushy tree 5 m. high, with long weak branches; flowers cream-colored with pink calyx; ripe fruit green).

It can scarcely be doubted that this number collected at the type-locality represents Lauterbach's *Syzygium Lorentzianum*. The flowers are about 7 mm. long instead of 5 mm., and the leaves are ovate-elliptic rather than lanceolate although the measurements approximate those of the original diagnosis; apart from these minor differences, the specimens suit the description perfectly. The fruit is ellipsoid to obovoid-ellipsoid, at times slightly ventricose, up to 3 cm. long, 2.6 cm. diameter, crowned by the truncate 4 mm. calyx-tube. Previously known only from flowering material. One branch of the collection shows a lateral inflorescence.

***Syzygium modestum* Diels, Bot. Jahrb. 57: 400. 1922, vel aff.**

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski* 1661, 1756, March 1930, alt. 950 m. and 1000 m., rain-forest (small tree 10–15 m. high; petals green, stamens white; fruit hard, oblong, purple when ripe, 3.5–3.8 cm. long, 2–2.5 cm. diameter)

These collections differ from Diels's description in having longer petioles ($\pm$ 1 cm. long), larger leaves ($\pm$ 18 cm. long, 7.5 cm. diameter), and the ultimate branchlets of the inflorescence tetragonous. There is a close resemblance between the collections and the descriptions of both ***Syzygium trivene* (Ridl.) comb. nov. (*Eugenia trivenis* Ridl. Trans. Linn. Soc. Bot. II. 9: 47. 1916), and *S. modestum* Diels.** Whether they are conspecific can only be determined by an actual examination of the types involved.

***Syzygium rubiginosum* sp. nov.**

Arbor magna; ramis cortice rimosis brunnescentibus; ramulis teretibus ad apicem paullo compressis rubro-brunnescentibus; foliis crasse coriaceis subnitidis, in sicco pallide brunnescentibus vel interdum rubro-brunnescentibus glabris inconspicue reticulatis, late vel anguste ellipticis, 7–13 cm. longis, 3.5–10.5 cm. latis, basi cuneatis vel rotundatis vel rotundato-cuneatis, apice obtusis vel retusis, costa perspicua, nervis primariis utrinsecus 9–13 utrinque distincte manifestis in venam intramarginalem aequaliter manifestam 2–4 mm. a margine confluentibus; petiolo $\pm$ 1 cm. longo atro-fusco minute rugoso; inflorescentiis terminalibus amplis, 9–13 cm. longis, 10–20 cm. latis, a basi ramosis, ramulis substrictis rubescenti-brunnescentibus, cortice levi, bracteis ovatis obtusis, vix 1.5 mm. longis, cito caducis; floribus sessilibus, alabastris 1 cm. longis; calycis tubo pyriformi (parte supra ovarium 3 mm. producta) 7–8 mm. longo, lobis 4 obtusis, 1 mm. longis, 2–3 mm. latis, maturitatem versus deciduis; petalis $\pm$ 5 mm. diametro calyptratis caducis; staminibus $\pm$ 1 cm. longis, antheris oblongis $\pm$ 6 mm. longis; fructibus minute verruculosis subglobosis vel transverse ellipsoideis, usque 3 cm. diametro, 2.5 cm. longis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7491 (TYPE), 7510, August 1936, plentiful and, with a few other large outstanding trees, forming a super-canopy layer in the rain-forests (trunk cylindrical or slightly fissured at base; bark very thick, hard, exfoliating in rather flaky suberose scales; leaves stiff, smooth, shining, with slightly recurved margins; flowers white); Tarara, Wassi Kussa River, *Brass* 8390, December 1936, common in rain-forest fringing river (tree 15–20 m. high, with thick fibrous crumbly brown bark; leaf-venation obscure beneath; young fruit white).

In the terminal inflorescence with fairly large flowers as well as the elliptic leaves, this species suggests *Syzygium grande* (Wight) Walp., but the reticulate venation is much less marked and the flowers do not taper to a stipe-like base; also the fruit is subglobose to transversely ellipsoid rather than oblong-ovoid.

Syzygium Schumannianum (Niedenzu) Diels, Bot. Jahrb. **57**: 402. 1922, vel aff. *Eugenia neurocalyx* K. Schum. & Hollr. Fl. Kaiser Wilhelms Land 90. 1889, non A. Gray.

Jambosa Schumanniana Niedenzu in Engler & Prantl, Nat. Pflanzenfam. **3**(7): 84. 1893.

Eugenia Schumanniana Greves, Jour. Bot. **61**: Suppl. 18. 1923.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13610, March 1939, alt. 850 m., common in rain-forest of more or less swampy river-plain (subsidiary tree $\pm$ 20 m. high; fruit white, prominently ribbed).

We have only a fruiting specimen to compare with the original description which is based probably on a flowering specimen with immature fruit. The leaves of *Brass* 13610 are 9–17 cm. long, 3.5–7 cm. broad, oblanceolate-oblong (rather than oblong) with a recurving apical tip; the 13–17 obvious primary veins join the inner equally manifest intramarginal vein 5–6 mm. within the margin, the outer one is much fainter and closer to the margin. Outside and within on the calyx-tube projecting beyond the ovary the fruit is copiously glandular; the youngest one shown in the collection is 3 cm. long and near the base 1 cm., narrowing towards the apex to about 7 mm. diameter; the older fruits are distinctly lageniform, about 4 cm. long and

1.5–2 cm. diameter in the middle of the enlarged lower part, the upper part of the calyx-tube between the base of the style and the recurved lobe is 1.5 cm. long. Usually there is a definite marked line or region at the base of the lobes indicating the staminal disk. In this collection the lobes are somewhat irregular in size and on these is a lighter colored zone which might indicate where the stamens were attached, in which case it would seem as if the true calyx-lobes had been shed or persisted as remnants beyond this zone and the apparent recurved lobes really represent the upper part of the stiff calyx-tube which has split at the apex along some of the prominent ridges. On one inflorescence axis were remnants of stamens which we assume belonged to the flower of this species. The anthers are very small (0.5 mm. diameter).

***Syzygium subglobosum* sp. nov.**

Arbor $\pm$ 26 m. alta; ramorum cortice desquamato; ramulis compressis atrofusis; foliis coriaceis, in sicco supra viridi-brunnescentibus vel atrofusis inconspicue reticulatis, subtus pallidioribus fere glaucis, ellipticis, 13–14 cm. longis, 7–8 cm. latis, utrinque subaequaliter rotundato-angustatis, basi rotundato-cuneatis vel obtusis, apice recurvatis breviter obtuse-que acuminatis (saepissime fractis), margine revolutis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus $\pm$ 15 subtransversis supra manifestis subtus subobscuris in venam intramarginalem circiter 7 mm. a margine confluentibus, vena intramarginali secundaria inconspicua $\pm$ 3 mm. a margine disposita; petiolo $\pm$ 1.5 cm. longo atrofusco; inflorescentiis terminalibus, in fructu 8–10 cm. longis, subcorymbosis; floribus non visis; fructibus subglobosis $\pm$ 2 cm. diametro cictricula calycis loborum coronatis, lobis duobus oppositis visis (1 mm. longis 2 mm. latis) rotundatis deciduis, in fructu calycis tubo brevissimo fere nullo.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 12584* (TYPE), February 1939, alt. 1150 m., occasional on ridges in primary forest (tree 26 m. high, 63 cm. diameter; bark red, scaly; fruit green-brown); 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11945*, January 1939, alt. 1830 m., rare in rain-forest (tree 28 m. high, 64 cm. diameter; bark reddish brown, scaly, smooth).

The best features of this species are the very dark branchlets, the rather stiff leaves with the widely spreading primary veins more readily seen above than below, and the terminal inflorescence. The fruits look very much like those of a specimen of *Eugenia kuranda* F. M. Bail. from Queensland, but the depression at the apex of the fruit is much shallower, in fact almost none. Two calyx lobes still adhere to a small fruit; these are opposite so it seems safe to conclude that the flower is 4-merous.

***Syzygium Waterhousei* sp. nov.**

Arbor gracilis 6–8 m. alta; ramulis subteretibus pallide brunnescentibus; foliis chartaceis vel tenuiter coriaceis minute pellucido-punctatis vel maturis impellucidis inconspicue subtrabeculatis reticulatis, lanceolatis vel lanceolato-ellipticis interdum ellipticis, 15–25 cm. longis, 5–12 cm. latis, basi cuneatis vel obtusis apice acutis vel breviter acuminatis, costa supra leviter canaliculata subtus elevata, nervis primariis patentibus utrinsecus 10–13

supra impressis subtus perspicuis in venam intramarginalem 5–6 mm. a margine confluentibus; petiolo circiter 1 cm. longo; inflorescentiis terminalibus vel lateralibus a basi compacte ramosis vel breviter pedunculatis, $\pm$ 6 cm. longis, 5–10 cm. latis, ramis ramulisque leviter compressis non angulatis; floribus apice ramulorum sessilibus plerumque cymosis; alabastris $\pm$ 9 mm. longis; calycis tubo circiter 9 mm. longo, sub apice 6–7 mm. diametro, turbinato vel obconico basi vix 2 mm. stipitato, margine fere truncato indistincte lobato; petalis calyptratis 3–4 mm. diametro; staminibus vix 1 cm. longis; fructibus circiter 3.5 cm. longis, 1.5–2 cm. diametro, subfusiformibus vel subpyriformibus, semine oblongo, 1.7 cm. longo, 1 cm. diametro.

BISMARCK ARCHIPELAGO: New Britain, Siwai, *Waterhouse* 120. SOLOMON ISLANDS: *Ysaabel*: Tiratona, *Brass* 3208 (TYPE), November 1932, alt. 600 m. mountain forests, very common (slender tree with drooping branches, 6–8 m. tall; brown scaly bark; inflorescence pale brown; fruit brown, dry; seed purple). *Bougainville*: Kieta, *Kajewski* 1602, March 1930, alt. 100 m., common in rain-forest on creek bank (small tree up to 10 m. high; flower buds light creamy green with a touch of pink); Mar-marromino, *Kajewski* 2207, September 1930, alt. 50 m., common in rain-forest (medium sized tree up to 15 m. high).

The best characters of this species are the fairly prominent primary and intramarginal veins of the leaves, the fairly large almost truncate flower-buds, the nearly terete axis and branches of the inflorescence, and the subfusiform or subpyriform fruits.

M. Leaves with close venation (primary and secondary about equally prominent).

N. Leaves rounded, obtuse, or shortly obtuse-acuminate (cf. also S. leptanthum and S. subcorymbosum).

***Syzygium acmenoides* sp. nov.**

Arbor usque 30 m. alta; ramulis pallide brunnescentibus subteretibus, epidermide tenuissima sub lente exfoliata, cortice crebre rimoso; foliis tenuiter coriaceis pellucido-punctatis supra olivaceis subtus pallide brunnescentibus manifeste crebre reticulatis, oblongo-ellipticis vel lanceolato-ellipticis, 5.5–9 cm. longis, 2.5–3.8 cm. latis, utrinque angustatis basi cuneatis vel acutis apice obtusis vel late obtuseque acuminatis margine vix revolutis, costa supra plana vel leviter canaliculata subtus prominula, nervis numerosis valde adscendentibus supra nempe striatis subtus perspicuis in venam intramarginalem aequaliter perspicuam 1 mm. a margine confluentibus; petiolo 5–7 mm. longo; inflorescentiis terminalibus a basi ramosis 5–9 cm. longis latisque; ramis ramulisque subangulatis; floribus non visis; fructibus sessilibus basi tenuiter stipitatis (stipite 3–4 mm. longo), supra depresso globosis, in sicco $\pm$ 1 cm. diametro calycis lobis 4 brevissimis coronatis.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8644 (TYPE), January 1937, one of the chief dominants in rain-forests (handsome tree attaining 30 m.; bark pale brown, hard, shedding in very small scales; leaves slightly concave; fruit white, rugose, 2–2.5 cm. diameter); Penzara, between Morehead and Wassi Kussa Rivers, *Brass* 8465, December 1936, common in creek fringing rain-forest (tree 12–14 m. high; fruit white, rugose).

Seemingly, this is a very distinct species readily recognized by the fairly thin somewhat obtuse leaves with strongly ascending close reticulate vena-

tion, somewhat similar to that found in *Syzygium Muelleri* Miq. of Borneo and the Malay Peninsula. The fruit is much wrinkled, having shrunk almost half its size in drying.

***Syzygium adelphicum* Diels, Nov. Guin. 14: 93. 1924.**

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11995*, February 1939, alt. 2180 m., common on ridges in primary forest (tree 23 m. high, 37 cm. diameter; flowers white).

This collection is a fairly good match for the description of *Syzygium adelphicum* Diels. It is to be noted, however, that although the terminal inflorescences are sessile or subsessile, those in the upper leaf-axils have a peduncle 4–5 mm. long. The upper part of the internodes of the new branchlets is narrowly winged; toward the base of the internodes the wings expand and seemingly touch or overlap to form a sort of a pocket or sac. As the branchlet grows older the bark cracks off and this character is lost.

***Syzygium adelphicum* var. *adenanthum* var. nov.**

A forma typica differt foliis minoribus 0.5–1.2 cm. longis, 0.4–0.9 cm. latis, crebre pellucido-punctatis, nervis primariis utrinque prominulis, petiolo 1.5–2 mm. longo, inflorescentiae bracteis alabastra in longitudine subaequantibus.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, *Brass 4040* (TYPE of var.), May 1933, alt. 2300 m., the commonest mossy forest tree (shapely tree 40–50 ft. tall with open crown densely foliated at the branch tips; bark brown and flaky; pale hard wood; leaves very glossy, dark veined beneath; petals and stamens white tinged with pink; small green fruit); *Brass 4854*, August 1933, alt. 2700 m., forest fringe just below cleared summit of mountain (densely foliated flat-topped tree 4–5 m. high; shining small leaves with reddish brown margins giving the whole tree a brown appearance).

These collections from Mt. Tafa so closely approach the smaller branches of *Brass & Versteegh 11995* which we have interpreted as *Syzygium adelphicum* Diels that we have been unable to decide whether a series of collections would show sufficient intermediates to prove them to be a single species or two closely related ones. Meanwhile, we note that the leaves of *S. adelphicum* Diels are opaque, except when very young, although copiously dotted on the lower surface with dark glands, and the primary veins appear merely as lines on the upper surface; on the other hand, in *Brass 4040*, *4854*, the leaves are copiously pellucid-punctate and the primary veins are almost equally elevated on both surfaces. As a whole the leaves are smaller with shorter petioles and much more crowded than in the collection from the Bernhard Camp region.

***Syzygium effusum* (A. Gray) C. Muell. in Walpers Ann. 4: 838. 1857; Diels, Bot Jahrb. 57: 409. 1922.**

Eugenia effusa A. Gray, Bot. U. S. Expl. Exped. 524. 1854.

NORTHEASTERN NEW GUINEA: Wareo, *Clemens 1795*, February 1936, alt. about 600–900 m.; Quembung, *Clemens 2136*, March 1936, alt. about 600 m. SOLOMON ISLANDS: Bougainville: Lake Lurulu, *Kajewski 2065*, August 1930, alt. 1500 m., rain-forest (medium sized tree up to 15 m. tall; fruit whitish green, 4 mm. long, 5 mm. diameter — one of the largest trees in this area of stunted trees).

The collections above cited are a fairly good match for the type of this species collected first in Fiji. The Solomon Islands collection is in young

fruit; some of the leaves tend to be slightly narrowed into an obtuse rather than a rounded apex which, on drying, rolled back; the inflorescence is somewhat shorter, with more robust branchlets and perhaps the tendency to 4-angled branchlets is a little more marked than in the original, but temporarily we are placing the collection with this species.

Syzygium ganophyllum Diels, Bot. Jahrb. **57**: 408. 1922.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11988*, February 1939, alt. 2000 m., frequent on ridges in primary forest (tree 20 m. high, 46 cm. diameter; fruit light green); 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 11913a*, January 1939, alt. 1740 m., frequent on rain-forest slopes.

Syzygium micropetalum sp. nov.

Arbor $\pm$ 20 m. alta; ramis atro-cinereis cortice rimosis; ramulis 4-angulatis rubro-brunnescentibus; foliis tenuiter coriaceis, novellis crebre pellucido-punctatis, supra olivaceis minute punctatis subtus pallidioribus minute atro-glandulosis, oblongis vel obovato-ellipticis, 2.5–5 cm. longis, 0.8–2.5 cm. latis, basi anguste cuneatis apice obtusis, costa supra canaliculata subtus elevata, nervis primariis utrinsecus $\pm$ 17 interdum furcatis oblique patentibus, supra inconspicue manifestis subtus prominulis, secundariis $\pm$ prominulis, vena submarginali a margine 1 mm. remota; petiolo circiter 4 mm. longo; inflorescentiis terminalibus axillaribusque folia in longitudine subaequantibus, pauciramosis, rhachi ramisque tetragonis; floribus sessilibus 3–7 in apice ramorum dispositis; calycis tubo obconico-campanulato circiter 3 mm. longo, 2 mm. lato, minute 4-lobato; petalis singillatim caducis; staminibus brevibus; fructibus immaturis depresse globosis 5 mm. diametro.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh 11156* (TYPE), *11134*, November 1938, alt. 2400 m. and 2300 m., primary forest (tree 20–21 m. high, 33–34 cm. diameter; bark brown; flowers white; young fruit green, older ones violet).

When there is opportunity to examine the type, these collections may be found to belong to *Syzygium benjaminum* Diels. However, there are several characters in which our material is at variance with Diels's scanty description. The branchlets are definitely 4-angled, the leaves are larger (but vary greatly in size), copiously pellucid-punctate, and longer petiolate, and the flowers are not stipitate.

Syzygium myriadenum sp. nov.

Arbor magna; ramulis nigrescente-brunnescentibus cortice crebre rimosis non desquamatis, novellis brunnescentibus valde compressis vix angulatis; foliis chartaceis, in sicco olivaceis crebre minuteque glanduloso-punctatis utrinque manifeste reticulatis, oblanceolatis, 10–13 cm. longis, 4–5 cm. latis, basi longe angustatis acutis vel acuminatis apice obtusis vel subrotundatis, costa supra impressa subtus elevata, nervis numerosis tenuibus utrinque distincte manifestis in venam intramarginalem 1.5–3 mm. a margine conjunctis; petiolo 1.5–2 cm. longo; inflorescentiis terminalibus, $\pm$ 7 cm. longis, a basi ramosis, ramis compressis, ramulis 4-angulatis; bracteis brevissimis latis inconspicuis; floribus non visis; fructibus in sicco irregulariter saepissime longitudinaliter corrugatis oblongis vel subovoideis, 1 cm. longis, $\pm$ 5 mm. diametro, apice calycis lobis 4 (1 mm. longis, 2 mm. latis) coronatis.

SOLOMON ISLANDS: Guadalcanal: Sorvorhio Basin, *Kajewski* 2713 (TYPE), January 1932, alt. $\pm$ 180 m., common in rain-forest (large sized tree up to 18 m. high, with fibrous bark; wood light brown, heavy; fruit red when ripe, about 1.3 cm. long, 7 mm. diameter).

The outline of the leaves and their venation somewhat resemble *Syzygium micrandrum* (Ridl.) comb. nov. (*Eugenia micrandra* Ridl. Trans. Linn. Soc. Bot. II. 9: 48, 1916); but, the leaves are much thinner in texture, the fruit is red, and the wrinkled pericarp indicates a soft perhaps spongy texture in the flower. Although we have not seen the fruit of *Syzygium micrandrum*, the flower suggests a fruit of firmer texture.

Syzygium obtusum sp. nov.

Arbor $\pm$ 23 m. alta; ramis teretibus brunnescentibus, ramulis compressis vix angulatis; foliis coriaceis impellucidis, in sicco supra brunneis vel atro-brunneis subtus pallidioribus crebre minuteque atro-glandulosis, obovatis, 2.5–6.5 cm. longis, 1–4 cm. latis, basi cuneatis apice rotundatis margine anguste revolutis, costa supra canaliculata subtus prominente, nervis primariis utrinsecus 10–15 subpatentibus, utrinque inconspicuis vel subobscuris in venam intramarginalem $\pm$ 2 mm. a margine confluentibus, reticulo nullo; petiolo 5 mm. longo; inflorescentiis terminalibus 7–9 cm. vel ultra longis latisque, ramulis subangulatis; floribus immaturis sessilibus; bracteis non visis; alabastris turbinatis 4.5 mm. longis, apice 2.5 mm. diametro; calycis tubo minute 4-dentato.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh* 14030 (TYPE), April 1939, alt. 75 m., frequent in the primary rain-forest of lower mountain slopes (tree 23 m. high, 48 cm. diameter; bark dark brown, scaly; flower-buds red); Babo, *Neth. Ind. For. Service* bb.21810.

The species belongs in the same complex with *Syzygium ganophyllum* Diels but the leaf-venation on both surfaces is readily seen with the naked eye; perhaps it is also close to *S. leucoderme* Diels, but the bark is darker in color.

Syzygium retivenium sp. nov.

Arbor 31 m. alta, 50 cm. diametro; ramis decorticatis cortice inter nodos rimoso interrupto; ramulis basi petioli deorsum utrinque decurrente inconspicue subalatis atrofusis; foliis rigide coriaceis, in sicco supra brunnescentibus $\pm$ punctatis subtus pallidioribus utrinque subprominule crebre reticulatis oblongis, 2–4 cm. longis, 0.7–1.5 cm. latis, utrinque subaequaliter angustatis basi cuneatis vel acutis apice acutiusculis vel obtusis margine recurvatis, costa supra canaliculata subtus prominente, nervis primariis saepius furcatis utrinsecus circiter 15, in reticulo supra subtusque prominulo inconspicuis, vena intramarginali $\pm$ 0.5 mm. a margine remota; petiolo 2.5–3 mm. longo; inflorescentiis immaturis terminalibus, foliis in bracteas abeuntibus foliatis; floribus sessilibus apice ramulorum cymosis; alabastris immaturis circiter 3 mm. longis bracteis fere obtectis; calycis tubo obconico, lobis 4 parvis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 11989 (TYPE), February 1939, alt. 1090 m., common on slopes in primary rain-forest (tree 31 m. high, 50 cm. diameter; bark 8 mm. thick, brown, flaking off in large scales; flower-buds green).

Amongst the described species of *Syzygium* this seems nearest to *S.*

homichlophilum Diels which also has a leafy inflorescence and obviously reticulate leaves. From the description of Diels's species it appears to have larger somewhat differently shaped leaves, longer petioles, and more flowers at the apex of the branchlets. In the specimen here cited the inflorescence protrudes beyond the leaves.

***Syzygium sylvanum* (Ridl.) comb. nov.**

Eugenia sylvana Ridl. Trans. Linn. Soc. Bot. II. **9**: 48. 1916.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 11978, January 1939, alt. 1500 m., primary forest (tree 19 m. high; flower-buds reddish); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12543, 12552, February 1939, alt. 1170 m. and 1150 m., occasional in primary forest (tree 26–33 m. high; fruits white). NORTHEASTERN NEW GUINEA: Ogeramnang, *Clemens* 4692, December 1936, alt. $\pm$ 2360 m.

N. Leaves acuminate.

***Syzygium attenuatum* (Miq.) Merr. & Perry, Mem. Am. Acad. Arts Sci. **18**(3): 185 (Mem. Gray Herb. **4**: 185). 1939.**

Jambosa attenuata Miq. Fl. Ind. Bat. **1**(1): 437. 1855.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13123, March 1939, alt. 850 m., frequent in primary rain-forest of plains (tree 20 m. high, 46 cm. diameter; bark 11 mm. thick, brown, scaly; fruit light green). BRITISH NEW GUINEA: Oroville Camp, Fly River, *Brass* 7422, August 1936, common in rain-forests (large canopy tree with somewhat flaky fibrous brown bark and hard brown wood; flowers white). NORTHEASTERN NEW GUINEA: Sattelberg, *Clemens* 1853, 2220, February–April 1936, alt. $\pm$ 1050 m.

These collections differ slightly from the Malaysian material which we have so named. The leaf is more shortly obtuse-acuminate and the flowers at the apex of the branches are not so obviously umbellate; nevertheless, we have not yet found sufficiently tangible differences to regard this material as specifically different from that of Malaysia.

***Syzygium Buettnerianum* (K. Schum.) Niedenzu in Engler & Prantl, Nat. Pflanzenfam. **3**(7): 85. 1893; Diels, Bot. Jahrb. **57**: 406. 1922.**

Eugenia Buettneriana K. Schum. Fl. Kaiser Wilhelms Land 89. 1889.

NETHERLANDS NEW GUINEA: Hollandia, *Neth. Ind. For. Service* bb.28981, August 1939. NORTHEASTERN NEW GUINEA: Ogeramnang, *Clemens* 4492, 5013, December 1936, January 1937, alt. 1700–1800 m. BRITISH NEW GUINEA: Gaima, Lower Fly River (east bank), *Brass* 8314, common in rain-forests (large profusely flowering canopy tree; bark brown, thick, fibrous, deeply fissured; leaf-margins slightly recurved; flowers purple with red stamens).

This species was described from Northeastern New Guinea. These collections appear to suit the description fairly well. The two Clemens collections are very similar to the others except that the leaves are strongly and finely reticulate on both surfaces, and the epidermis of the branchlets of the inflorescence does not appear to scale off in small flakes.

***Syzygium finisterrae* (Lauterb.) comb. nov.**

Eugenia finisterrae Lauterb. Rep. Sp. Nov. **13**: 240. 1914.

NORTHEASTERN NEW GUINEA: Warco, *Clemens* 1420, January 1936, alt. $\pm$ 600 m.; Yunzaing, *Clemens* 3004, 4193, April 1936, alt. $\pm$ 1350 m. alt.

The inflorescence in these collections is smaller than in the description of the type but otherwise they seem to agree with the description.

Syzygium leptanthum (Wight) Niedenzu in Engl. & Prantl, Nat. Pflanzenfam. **3**(7): 85. 1893; Lauterb. Nov. Guin. **8**: 322. 1910; Diels, Bot. Jahrb. **57**: 403. 1922.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7567, August 1936, rain-forest: the chief component of a narrow fringe community occupying shallow margins of lake (low spreading tree 5-6 m. high, producing adventitious roots from trunk and branches; fruit black, fleshy), *Brass* 7658, September 1936 (flowering material of 7567; flowers white); Upper Wassi Kussa River, *Brass* 8605, January 1937, rain-forest (small tree 5 m. high overhanging river; fruit black, acid).

This is probably the species which Greves, Jour. Bot. **61**: Suppl. 18. 1923, reported as representing *Eugenia claviflora* Roxb. These species and those closely related all need to be examined as to types, distinguishing features and geographic ranges. Until such time as this can be done, the specific concepts cannot well be delineated.

Syzygium onesimum sp. nov.

Arbor $\pm$ 25 m. alta; ramulis teretibus brunnescentibus; foliis tenuiter coriaceis vel chartaceis, in sicco supra saturato-brunneis subnitidis subtus pallidioribus sub lente reticulatis impellucidis, lanceolatis vel anguste ovatis, 7-12 cm. longis, 2.3-4 cm. latis, basi rotundato-cuneatis apice sensim vel interdum subabrupte longe acuminatis, acumine 1.5-2 cm. longo, costa supra canaliculata subtus subcarinata, nervis primariis numerosis patentibus supra manifestis vel subobscuris subtus distincte manifestis non prominulis in venam intramarginalem 1-1.5 mm. a margine confluentibus, venis secundariis fere primariis aequalibus; petiolo 5-8 mm. longo; inflorescentiis terminalibus usque 5 cm. longis basi cymoso-ramosis, ramis ramulisque $\pm$ compressis angulatis, bracteis caducis; floribus 1-3 apice ramulorum sessilibus; alabastris clavatis vel anguste turbinatis subangulatis 4 mm. longis, apice circiter 2 mm. diametro; calycis tubo 3-3.5 mm. longo, 4-dentato; petalis calyptram convexam formantibus; staminibus 3-4 mm. longis; fructibus non visis.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2043 (TYPE), 2091, August 1930, alt. 850 m. and 1000 m., common in rain-forest (medium to tall tree 25 m. high; stamens white, very numerous; occasionally found as a parasite in a similar manner to a fig). Ysabel: Tataba, *Brass* 3445, January 1933, alt. 50 m., rain-forest ridges (slender tree 20 m. tall; brown uneven bark, red within, falling in large flakes; hard brown wood; leaves with midrib pale on both surfaces; flowers white).

Brass 3445 differs from the type-collection in that the twigs are cinereous and the leaves are much longer petiolate (petiole 1-1.8 cm. long), the venation of the leaves is less marked but the inflorescence is only in young bud, so we believe this is the best disposition of the collection at present. The species is somewhat like *Eugenia striata* Koord. & Val. Atlas Baumart. Java **3**: fig. 501, E-K. 1915, but the flowers are a little smaller and hardly (if at all) stipitate at the base.

Syzygium plumeum (Ridl.) comb. nov.

Eugenia plumea Ridl. Trans. Linn. Soc. Bot. II. **9**: 46. 1916.

NORTHEASTERN NEW GUINEA: Ogeramang, *Clemens* 5450, 5459, February 1937, alt. $\pm$ 1800 m.; Yoangen, *Clemens* 6599, June 1937, alt. 1600 m.

The species was described from Netherlands New Guinea.

Syzygium rostratum (Blume) DC. Prodr. **3**: 261. 1828.

Calyptranthus rostrata Blume Bijdr. 1092. 1826.

NETHERLANDS NEW GUINEA: Hollandia, *Neth. Ind. For. Service* bb.25064, July 1938, alt. 50 m.

A species previously recorded from Sumatra, Java and Borneo. It is quite probable that the following sterile collections from Seroei, Biak Island, also belong here: *Neth. Ind. For. Service* bb.30677, bb.30682, bb.30688, bb.30747, bb.30750, bb.30826.

Syzygium subcorymbosum sp. nov.

Arbor gracilis 25 m. alta; ramis cortice rimosis; ramulis teretibus, novellis compressis sulcatis brunnescentibus; foliis coriaceis impellucidis, in sicco supra subnitidis atro-brunneis subtus fere cupreo-brunnescentibus, ellipticis, 5.5–7 cm. longis, 3–4 cm. latis, utrinque subrotundatis basi late cuneatis apice abrupte breviterque acuminatis, acumine $\pm$ 5 mm. longo obtuso, costa supra subcanaliculata subtus prominente, nervis primariis numerosis (supra lamina striolata) subtus cum secundariis atque reticulo inconspicuis subobscuris; petiolo 3–5 mm. longo; inflorescentiis terminalibus fere a basi ramosis 8 cm. longis, 15 cm. latis subcorymbosis; floribus sessilibus, bracteis caducis; calycis tubo 7–9 mm. longo, apice 4 mm. diametro, infero substipitiformi supero subcampanulato subaequilongus, margine 5-dentato; petalis calyptram convexam formantibus caducis; staminibus fere 1 cm. longis; fructibus ignotis.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5573 (TYPE), November 1933, alt. 100 m., forest on low ridges (slender tree 25 m. high; grey slightly scaly bark; leaves glossy; flowers white).

The general habit of this species suggests *Syzygium inophylloides* (A. Gray) C. Muell. of Samoa, but the flowers are much larger. Among the Papuan species, *Brass* 5573 is perhaps nearest to *Syzygium leptophlebium* Diels, nevertheless, in his description Diels emphasizes the length of the petiole "(pro genere) longus," which here is rather short. Whether this is an unusual variation or a specific difference can only be determined with more material and the privilege of examining the type.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

STUDIES IN THE THEACEAE, XII
NOTES ON THE SOUTH AMERICAN SPECIES OF
TERNSTROEMIA

CLARENCE E. KOBUSKI

SINCE the type species, *Ternstroemia meridionalis* Mutis ex Linnaeus f., was first described in 1781, well over a hundred entities from tropical America have been accredited to this genus. Two regional studies have been published on these American species. In 1866 Wawra discussed the Brazilian and closely related species in Martius, *Flora Brasiliensis*, and in 1896 Urban, in *Botanische Jahrbücher*, offered his excellent treatment of the West Indian species.

At the suggestion of some of my colleagues, I borrowed from several of the leading American herbaria all the available material (American) of *Ternstroemia* in the hope of preparing a monographic treatment of this genus. Although knowing full well that many of the types were deposited in European herbaria and that these specimens would not be available for this work, I had hoped that I might find sufficient authentic representative material in America to offset this lack of European types. I soon discovered my error. When the very early species were described, the authors were exceedingly brief in their descriptions, stressing only the most obvious characters, not realizing that these obvious characters such as "leaves coriaceous, obovate-elliptic, tapering at the base into a petiole" would fit nearly every species already described and those to be described later. Fortunately, in the material borrowed from the Field Museum of Natural History (FM) were photographs of many of the missing types. Although the "concealed" characters such as petals, stamens, ovary, style and stigma could not be discerned, without these photographs the present study would have been impossible. To the far-seeing individuals who prepared these photographs, I am very grateful. Aiding equally were the type and otherwise authentic material from the Gray Herbarium (G), the herbaria of the New York Botanical Garden (NY), Missouri Botanical Garden (Mo), and the United States National Museum (US). To these institutions also I am much indebted. Although this brief study may not take on the noble title of monograph, I hope that the amplified descriptions with notes on specific relationships, the citations of literature and specimens and the synonymy may prove of assistance to workers in the various regions of South America. A second paper will be published in the near future dealing with the North American species of the genus.

The genus *Ternstroemia* was first proposed by Mutis in Linnaeus f., *Supplementum Plantarum*, 39. 1781. Various other names have been applied to this genus, such as *Taonabo* Aublet (1775), *Dupinia* Scoparius (1777), *Hoferia* Scoparius (1777), *Tonabea* Jussieu (1789), *Amphania*

Banks (1821), *Reinwardtia* Korthals (1840), *Llanosia* Blanco (1845), *Erytrochiton* Schlechter (1846), *Voelckeria* (1847) and *Mokofua* Kuntze (1891). *Taonabo* is the *nomen prius* of this group of synonyms and until a few years ago was used by several of the American botanists who followed the rule of strict priority laid down by the American Code of Nomenclature. However, the name *Ternstroemia* has been adopted by the members of the Congress of the International Code of Nomenclature as one of the "nomina conservanda" and the name *Taonabo* listed as "nomina rejicienda" thus ending any controversy which might have existed over the correct name.

Ternstroemia Mutis ex Linnaeus f.

Flowers hermaphroditic; sepals 5, rarely 6, imbricate, persistent. Petals 5, rarely 6, free to base, connate to middle or above the middle, very rarely to the apex, approaching cleistogamy, when free more or less imbricate. Stamens 25–300, 2- rarely few- or 1-seriate; filaments connate, the outer filaments adnate to the base of the petals; anthers usually longer than the filaments, rarely shorter, oblong or linear, the connective usually projected into an apiculate or caudate appendage, rarely muticous. Ovary 2-, 3-, rarely 1-loculate or, with accessory septa, 4–6-loculate, the ovules in each locule 2–20, rarely solitary, pendulous from the apex of the placenta on a more or less evolute funiculus. Style 1, entire or rarely deeply 2–3-parted; stigma or stigmata minutely punctiform or evolute, entire or lobate. Fruit indehiscent, rarely dehiscent at the apex into valves or by a circumscissile layer near the base. Seeds few; testa opaque, smooth, rarely plicate-rugulose, yellow, often covered with brown, many-celled papilli.

Glabrous trees or shrubs with the branches often subopposite or verticillate. Leaves spirally disposed, congested or verticillate at the apex of the current year's growth, usually coriaceous, rarely chartaceous or membranaceous, entire, subentire or rarely truly dentate. Flowers axillary, solitary, bracteolate, the bracteoles 2, rarely 4, opposite or subopposite, placed immediately beneath calyx, rarely with one somewhat removed on pedicel.

TYPE SPECIES: *Ternstroemia meridionalis* Mutis ex Linnaeus f.

KEY TO THE SOUTH AMERICAN SPECIES

- A. Fruit a dehiscent capsule.
 - B. Fruit with circumscissile dehiscence at the base (Bolivia) . . 1. *T. circumscissilis*.
 - BB. Fruit dehiscing at the apex into four valves (Brazil) 2. *T. dehiscens*.
- AA. Fruit an indehiscent capsule.
 - B. Ovary 4-loculate, loculi 1-seeded. (See also under BBBB).
 - C. Leaves distinctly dentate, dark-punctate on lower surface. . 34. *T. dentata*.
 - CC. Leaves entire (or finely serrulate), not punctate on lower surface.
 - D. Stigma punctiform.
 - E. Pedicels short, 0.5–0.7 cm. long; leaves obtusely acuminate at the apex, subrotund at the base; petiole 5 mm. long (Brazil) 3. *T. borbensis*.
 - EE. Pedicels 1.5–3.0 cm. long; leaves obtuse but not acuminate at the apex, subrotund at the base; petiole 10 mm. long. . . 36. *T. laevigata*.
 - DD. Stigma peltate, sometimes 4-crenate.
 - E. Style minute, 1 mm. or less long. 10. *T. brevistyla*.
 - EE. Style 4 mm. long in flower, 7 mm. long in fruit. . . 29. *T. oligostemon*.
 - BB. Ovary 1-loculate.
 - C. Leaves 18–21 cm. long, 7–8 cm. wide (British Guiana) . . . 4. *T. Gleasoniana*.
 - CC. Leaves 3–5 cm. long, 1.2–2.5 cm. wide (Venezuela) 5. *T. discoidea*.

BBB. Ovary 3-loculate.

- C. Style 3-parted (British Guiana, Dutch Guiana, Venezuela, Brazil)
6. *T. punctata*.

CC. Style entire.

- D. Sepals and bracteoles entire and scarious-margined, not glandular-denticulate.

- E. Pedicels short, 4-7 mm. long, 2-3 mm. thick; petals 10-11 mm. long, 6-8 mm. wide 24. *T. camelliaefolia*.

- EE. Pedicels 10-25 mm. long, slender, graceful; petals 5-6 mm. long, 2-4 mm. wide.

- F. Leaves membranaceous, veins conspicuous; stigma subcapitate, tri-crenate (French Guiana, Trinidad) 7. *T. delicatula*.

- FF. Leaves coriaceous, veins obscure; stigma punctiform (British Guiana) 8. *T. Browniana*.

DD. Sepals and bracteoles glandular-denticulate on the margin.

- E. Stigma subcapitate, crenate, usually 3-crenate.

- F. Style minute, hardly equalling the ovary in length, or shorter.

- G. Leaves 10-12 cm. long, 4-5 cm. wide, nigro-punctate beneath, the veins (ca. 7 pairs) evident; pedicels 1.5-2.0 cm. long (Brazil) 9. *T. alnifolia*.

- GG. Leaves 3-5 cm. long, 2-3 cm. wide, not punctate below, the veins not evident; pedicels 6-8 mm. long (Venezuela)
10. *T. brevistyla*.

- FF. Style longer than the ovary (3-4 mm. +).

- G. Fruit large, up to 2.5 cm. long and 2 cm. diameter; pedicels 2.5-4.5 cm. long, 4-5 mm. diameter; leaves oblong-obovate, up to 16 cm. long 23. *T. macrocarpa*.

- GG. Fruit not over 1.2 cm. long and the same diameter; pedicels ca. 1 cm. long; leaves cuneate, up to 6 cm. long
46. *T. cuneifolia*.

EE. Stigma punctiform.

- F. Leaves acuminate at apex; connective of stamens prolonged into a caudate appendage 1-2 mm. long; petals connate at base for one-half or more their entire length.

- G. Pedicels up to 4 cm. long; bracteoles 5-8 mm. long.

- H. Leaves 12-16 cm. long with 20-30 pairs of veins; pedicels very slender, pendulous from base (Peru)
11. *T. penduliflora*.

- III. Leaves 7-10 cm. long with 7-8 pairs of veins; pedicels sturdy, erect (Brazil) 12. *T. Candolleana*.

- GG. Pedicels 1.0-1.5 cm. long; bracteoles 0.7-1.4 mm. long (Brazil) 13. *T. subcaudata*.

- FF. Leaves obtuse at apex; petals connate at base but less than one-half the entire length; connective of stamen prolonged into a short apicule.

- G. Petiole 6-7 mm. long; pedicels 7-8 mm. long; leaves obovate, up to 7 cm. long and 3 cm. wide (British Guiana)
14. *T. Schomburgkiana*.

- GG. Petiole 10-15 mm. long; pedicel up to 25 mm. long; leaves oblong-obovate to lanceolate, 6-13 cm. long, 2.0-4.5 cm. wide (Brazil) 15. *T. brasiliensis*.

BBBB. Ovary 2-loculate.

- C. Corolla calyptrate, cleistogamous or nearly so, the corolla-walls thickened.

- D. Corolla opening by minute pore at apex, the lobes minute (ca. 1 mm. long and wide), the walls 1 mm. thick (Peru) 16. *T. globiflora*.

- DD. Although petal outlines distinguishable, apparently cleistogamous, a thickened band (1 mm. deep) at base (Colombia)...17. *T. congestiflora*.
- CC. Petals free, at least to near the middle, membranaceous.
- D. Style 2-parted.
- E. Leaves small, not over 7 cm. long and 1.5 cm. wide.
- F. Leaves elliptic-lanceolate, 4.5–6.5 cm. long, 1.0–1.5 cm. wide, the petiole 5–7 mm. long; sepals small, semi-orbicular, 3–5 mm. long, ca. 4 mm. wide (Venezuela).....18. *T. distyla*.
- FF. Leaves cuneate, 2.5–3.0 cm. long, 1.0–1.3 cm. wide, sessile; sepals long-attenuate, sharp-pointed, 13–15 mm. long, ca. 5 mm. wide at base (Venezuela).....19. *T. tristyla*.
- EE. Leaves very large, 13–19 cm. long, 5–8 cm. wide (British Guiana).....20. *T. grandiosa*.
- DD. Style entire.
- E. Outer calyx-lobes entire, scarious-margined, not glandular-denticulate; bracteoles may or may not be glandular-denticulate, if so, sparsely.
- F. Fruit unusually large, 2–4 cm. long, 2–4 cm. wide.
- G. Fruit 1–2-seeded; seeds ca. 3 cm. long, 1.5 cm. diameter, covered with a reddish brown crusty surface when dry (Brazil) 21. *T. Krukoffiana*.
- GG. Fruit 5–18-seeded, seeds not over 1 cm. long, surface smooth.
- H. Pedicel 25–45 mm. long, 4–5 mm. diameter at apex; calyx-lobes 9–13 mm. long, 10–15 mm. wide.
- I. Pericarp very thick, 4–6 mm. wide, porous or spongy; septa in fruit indistinguishable; bracteoles suborbicular, immediately below calyx (Peru)...22. *T. pachytrocha*.
- II. Pericarp shell-like; septa in fruit clearly defined; bracteoles triangular, 5–7 mm. below calyx on pedicel (Colombia).....23. *T. macrocarpa*.
- HH. Pedicels short, 4–7 mm. long, 2–3 mm. diameter; calyx-lobes 5–8 mm. long, 7–8 mm. wide (Venezuela).....24. *T. camelliaefolia*.
- FF. Fruit normal-sized (ca. 1.5 cm. or less long and as wide).
- G. Leaves linear-oblongate, 3–5 cm. long, 0.4–0.6 cm. wide; stigma punctiform; stamens with caudate appendages 1 mm. or more long (Venezuela).....25. *T. duida*.
- GG. Leaves oblong-obovate to elliptic, never less than 1 cm. wide; stigma peltate or bi-crenate; stamens with mucous or slightly apiculate appendages.
- H. Flowers large, ca. 2 cm. or more across; petals up to 12 mm. long, united for 3–4 mm. at base into a tube; stamens 125–200.
- I. Pedicels 15–17 mm. long, sturdy; leaves 8–10 cm. long, 3.5–4.5 cm. wide, with stout petiole 5–10 mm. long (Ecuador).....26. *T. Lehmannii*.
- II. Pedicels 5–10 mm. long, compressed; leaves small, 2–4 cm. long, 1.5–2.0 cm. wide, with short petiole 3–5 mm. long or shorter (Colombia)...27. *T. meridionalis*.
- HH. Flowers less than 1 cm. across; petals not over 5–7 mm. long, not united into a conspicuous tube.

- I. Leaves oblong-obovate to elliptic, the margin entire or subentire, the apex not generally retuse.
 - J. Petiole very short, ca. 3 mm. long; filaments crassate (Peru).....28. *T. Jelskii*.
 - JJ. Petioles longer, 8–14 mm. long; filaments filiform (Trinidad).....29. *T. oligostemon*.
- II. Leaves cuneate, the margin distinctly crenate, the apex consistently retuse (Venezuela).....30. *T. retusifolia*.
- EE. Outer calyx-lobes and bracteoles distinctly glandular-denticulate.
 - F. Style 2-parted for approximately half its length (Venezuela).....
.....31. *T. pungens*.
 - FF. Style entire.
 - G. Stigma punctiform.
 - H. Style unusually long, up to 10 mm.
 - I. Leaves completely revolute to midrib, subsessile, the petiole 1–2 mm. long (Venezuela).....32. *T. dura*.
 - II. Leaves flat, revolute only at margin, the petiole ca. 5 mm. long (Brazil).....33. *T. oleaefolia*.
 - HH. Style seldom over 5–6 mm. long.
 - I. Leaves distinctly dentate; connective of anthers projected for 2 mm. or more into a distinct caudate appendage (Brazil, French Guiana)....34. *T. dentata*.
 - II. Leaves entire or crenulate, never dentate; connective never projected into an appendage measuring more than 1 mm. in length.
 - J. Branchlets angled; leaves membranaceous, 2.5–3.0 cm. long, 1.0–1.5 cm. wide; veins (4–5 pairs) reticulate below (Peru).....35. *T. brachypoda*.
 - JJ. Branchlets terete; leaves coriaceous, up to 6 cm. or over (4 cm. in *T. verticillata*); veins, if evident, not reticulate.
 - K. Stamens equalling the corolla in length; petals connivent at apex, crisp (British Guiana).....
.....36. *T. laevigata*.
 - KK. Stamens included within the corolla; petals obtuse or spreading at apex, not connivent.
 - L. Stamens numbering over 300, the connective plane or muticous at the apex of the anther, not projected into an apicule (Bolivia).....
.....37. *T. polyandra*.
 - LL. Stamens numbering 100 or less, the connective projected at the apex of the anther into an apiculate appendage.
 - M. Petals joined for two-thirds or more from the base into a "tube."
 - N. Leaves obovate to cuneate-oblong, 2–4 cm. × 1–2 cm., truncate or retuse at apex, with petiole up to 5 mm. long (British Guiana)...38. *T. verticillata*.
 - NN. Leaves oblong-obovate, 6–8 cm. × 2.5–3.5 cm., abruptly acuminate at

- apex, with petiole ca. 10 mm. long
(Peru).....39. *T. Klugiana*.
- MM. Petals joined only at the base, not forming a "tube."
- N. Bracteoles ovate, ca. 4 mm. long; filaments compressed, very short, less than 1 mm. long (Brazil) . . .40. *T. carnosa*.
- NN. Bracteoles minute, 1-2 mm. long; filaments filiform, 1.5-3.0 mm. long.
- O. Leaves often asymmetrical, epunctate below; calyx-lobes 4-5 mm. long, 4-5 mm. wide; connective hardly muticous (Bolivia)
.....41. *T. asymmetrica*.
- OO. Leaves symmetrical, dark-punctate below; calyx-lobes 7-10 mm. long, 5-7 mm. wide; connective subacuminate (Colombia)
.....42. *T. clusiaeifolia*.
- GG. Stigma peltate, subcapitate or crenulate.
- H. Pedicels 4-6 cm. long.
- I. Leaves elliptic, acute at both ends, submembranaceous; calyx-lobes orbicular, ca. 5 mm. long (British Guiana) 43. *T. longipes*.
- II. Leaves obovate, obtuse or rounded at apex, coriaceous; calyx-lobes small, 2.5-3.5 mm. long, ca. 2.5 mm. wide (British Guiana) 44. *T. crassifolia*.
- HH. Pedicels up to 2.5 cm. long.
- I. Leaves seldom over 2.5 cm. long; pedicels 2.5 cm. long, equalling the leaves in length (Peru)
.....45. *T. quinquepartita*.
- II. Leaves up to 6-10 cm. long; pedicels much shorter in comparison.
- J. Leaves cuneate, obtuse and retuse at apex (Brazil) 46. *T. cuneifolia*.
- JJ. Leaves oblong-elliptic, obovate or oblanceolate, not cuneate; acuminate at apex.
- K. Leaves sharply serrate or subserrate with conspicuous veins (10 pairs) and reticulations below; bracteoles rounded (Bolivia)
.....47. *T. subserrata*.
- KK. Leaves entire or subentire with veins not evident; bracteoles triangular.
- L. Pedicels very short, 5-8 mm. long; calyx-lobes minute, 2-3 mm. long, 1.5-2.0 mm. wide; petals most minute, shorter than the calyx-lobes; style very short, 0.8 mm. long (Colombia) 48. *T. Killipiana*.
- LL. Pedicels slender, 15-25 mm. long; calyx-lobes 6-8 mm. long, 4-5 mm. wide; petals 8-9 mm. long; style 1.5 mm. long (Colombia)
.....49. *T. Mutisiana*.

1. *Ternstroemia circumscissilis*, sp. nov.

Arbor 15 metralis, ramulis griseis teretibus. Folia oblongo-obovata, 10-15 cm. longa et 4-7 cm. lata, coriacea, apice obtuse acuminata vel rotundata, basi cuneata, undique nitida et granuloso-punctata, margine revoluta, integerrima vel subcrenulata, costa supra canaliculata, subtus elevata, nervis (ca. 10 paribus) subinconspicuis, petiolis 1.5-2.0 cm. longis. Flores solitarii, pedicellis 1.5-2.0 cm. longis, gracilibus, bracteolis 2, oppositis late ovato-triangularibus inaequalibus 4×4 mm. et 2.5×2.5 mm. glanduloso-denticulatis; sepala 5, imbricata, suborbicularia, pergamentacea, subaequalia, 5.5-7.0 mm. longa et circa 6 mm. lata, margine subscariosa vel scariosa, non glanduloso-denticulata; petala 5 vel 6, membranacea, (5-)7-8 mm. longa et 5.0-5.5 mm. lata, apice rotundata, basi 3 mm. connata; stamina bi-seriata, circa 70, circa 4 mm. longa, filamentis 2 mm. longis gracilibus, basi connatis et ad corollam adnatis, antheris linearibus ca. 2 mm. longis, connectivo subacuminato; ovarium conicum, 2 mm. longum, 2(3-?)-loculare, loculis pauci-ovulatis, stylo circa 2 mm. longo, stigmatibus peltatis 1 mm. vel plus diametro. Fructus conicus pentagonus, 1-2 cm. longus, basi 1-2 cm. diametro, 2-3-loculatus, seminibus 4 in loculis 2, epicarpio (ut videtur) indurato ad 5 mm. crasso, basi optime circumscissili; seminibus complanatis, ca. 7 mm. longis.

DISTRIBUTION: Bolivia.

BOLIVIA: Dept. La Paz, Prov. Larecaja, Copacabana (about 10 km. south of Mapiri), alt. 850-950 m., *B. A. Krukoff 11065* (TYPE, AA; ISOTYPE, NY), Oct.-Nov. 1939 (tree 50 ft. high). — Mapiri, alt. 1500 m., *H. H. Rusby 486* (FM, G, Mo, NY, US), April 1886. — Mapiri Region, San Carlos, on way to San José, alt. 800 m., *O. Buchtien 895* (NY, US), Apr. 12, 1927. — Mapiri Region, San Carlos, alt. 750 m., *O. Buchtien 2082*, Sept. 1907.

The circumscissile dehiscence at the extreme base of the fruit is the outstanding character of this species. At dehiscence the fruit separates by a distinct cleavage line into a conical pentagonal cap (comprising most of the fruit) and the flat base. On the inside of the base, after separation, can be found the locular depressions showing the number of cells, which may vary from 2 to 3 on a single herbarium specimen. In the flowers examined only 2-celled ovaries were found. However, only a very few floral dissections were made because of the paucity of flowering material. The persistent calyx increases in size until in fruit it measures as much as 2 cm. across. In this respect it resembles some of the Polynesian species.

2. *Ternstroemia dehiscens* Huber in Bull. Soc. Bot. Genève, sér. 2, 6: 189. 1915.

DISTRIBUTION: Brazil.

BRAZIL: State of Pará, in field near Ariramba river, *A. Ducke 8032* (photo and fragment of TYPE, FM), Dec. 21, 1906.

Low shrub with gray branchlets. Leaves subcoriaceous, obovate, 5-7 cm. long, 2.0-3.5 cm. wide, obtuse at apex, often long acuminate, narrowed at base into a slender petiole 1 cm. long, the margin entire or obscurely denticulate, shining above, opaque below, the veins indistinct. Flowers axillary, solitary, with pedicels 1 cm. long; bracteoles semi-orbicular, ovate, minutely apiculate; sepals subequal, 4 mm. long, orbicular, with the inner lobes narrower, the outer lobes hardly glandular-denticulate; petals with subentire margins; stamens caudate; ovary 4-celled, the style equal to the ovary in length; the stigma minute [probably punctiform]. Fruit yellow,

ovoid-globose, 13 mm. long, 11 mm. diam., abruptly contracted into a style 5 mm. long, dehiscing into 4 pergamentaceous valves with involute margins, a central tetragonal columella persisting. Seeds cuneate-oblong, 7 mm. long, reddish.

Only a photograph and fragment of the type of this species were available for study. The outstanding character is the dehiscent capsule. The author remarks that when the style drops off, the capsule splits "subregulariter" into four pergamentaceous valves with involute margins. A central tetragonal columella persists. The photograph of the type shows a single capsule with four spread valves. Not having actually seen this specimen or one like it, I must refrain from making critical comments concerning this startling character.

3. **Ternstroemia borbensis**, sp. nov.

Frutex parvus, ramulis teretibus argenteis. Folia coriacea, elliptica vel obovata (marginibus imparibus), 5.0–8.5 cm. longa, 2–4 cm. lata, apice obtusa vel obtuse acuminata, basi subrotundata, margine serrata, plana, saepe ad basim subrevoluta, supra nitida, subtus opaca, costa supra canaliculata, subtus elevata, venis obscuris, petiolis 5 mm. longis. Flores solitarii, rosei, apice ramulorum positi, pedicellis 5–7 mm. longis recurvis, bracteolis 2 oppositis triangulari-ovatis circiter 1 mm. longis et basi 1 mm. diametro glanduloso-denticulatis; sepala 5, imbricata, inaequalia, pergamentacea, exterioribus lato-ovatis brevibus 4–5 mm. longis et 2.2–3 mm. latis, sparse glanduloso-denticulatis, interioribus obovatis circiter 5 mm. longis et 4.0–4.5 mm. latis; petala 5, ovata, 4.5–5.0 mm. longa, basi 2.5–3.0 mm. connata; stamina circiter 30, bi-seriata, inaequalia, antheris circiter 1.5 mm. longis, interiorum filamentis gracilibus circiter 1 mm. longis, exteriorum crassis 0.5 mm. vel minus longis, connectivo circiter 1 mm. projecto; ovarium conicum, circiter 1.5 mm. longum et 2 mm. basi diametro, 4-loculatum, loculis 1-ovulatis, stylo 3 mm. longo, stigmate punctiformi. Fructus ignotus.

DISTRIBUTION: Brazil.

BRAZIL: State of Amazonas, Borba (Rio Madeira), among low growth in sandy field, *A. Ducke* 468 (AA, TYPE; FM, Mo, NY, US), April 22, 1937 (small shrub with pink flowers).

The leaves of *T. borbensis* are generally elliptic, subrotund at the base, with the margins serrate and very irregular. The pedicels are short (5–7 mm. long) and recurved and the bracteoles are minute, triangular and glandular-denticulate. In all the flowers examined, the ovary proved to be four-celled, each cell 1-ovulate and the stigma punctiform. In the stamens the connective is projected into a long (1 mm.) caudate appendage.

4. **Ternstroemia Gleasoniana**, sp. nov.

Frutex 3.0–4.5 m. altus, ramulis crassis teretibus griseis. Folia crassocoriacea, oblongo-elliptica vel oblongo-obovata, 18–21 cm. longa et 7–8 cm. lata, apice obtusa vel subrotundata, abrupte acuminata, basi obtuse cuneata, subtus non punctata, margine subintegerrima, pauce glanduloso-denticulata, subrevoluta, costa supra profunde canaliculata, subtus elevata, venis 18–20 paribus, supra obscuris, subtus conspicuis, petiolis crassis 2.0–2.5 cm. longis. Flores apice ramulorum congesti; pedicelli crassi, 6–8 mm. longi, bracteis glanduloso-denticulatis basi depositis; bracteolis 2 inaequalibus late ovatis vel suborbicularibus, 3 mm. longis et 2.7–4.0 mm. latis, margine glanduloso-

denticulatis; sepala 5, imbricata, crassa, exterioribus 5–7 mm. longis et 5–6 mm. latis, margine sparse glanduloso-denticulatis, interioribus ovatis 6–8 mm. longis et 5.0–5.5 mm. latis, margine integerrimis scariosis; petala 5, ovata, longo-acuminata, 5.0–5.5 mm. longa, basi ad 3 mm. connata; stamina ca. 25, uni-seriata, 3–4 mm. longa, filamentis crassis 1.0–1.5 mm. longis, antheris subsagittatis ca. 2 mm. longis, connectivo 0.25 mm. projecto; ovarium subconicum ca. 1.5 mm. longum, 1-loculatum (ut videtur), pauci-ovulatum, stylo integerrimo, 4 mm. longo, stigmatе punctiformi. Fructus ignotus.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Potaro Landing, in clearing and along roadsides, *H. A. Gleason* 258 (TYPE G; NY), June–July 1921 (shrub 12–15 ft. high).

This species is delimited by the following outstanding characters: (1) shrub 3–4 m. high; (2) leaves unusually large (18–21 × 7–8 cm.), thick-coriaceous, under surface smooth (not punctate); (3) flowers congested at apex of branchlets; (4) pedicels short, 6–8 mm. long, with glandular-denticulate bracts at the base; (5) petals ovate, long-acuminate, joined for over two-thirds entire length; (6) style entire and stigma punctiform.

Great difficulty was experienced in making dissections of the ovary of this species. Because the flowering material was sparse only three dissections could be made. The ovary appeared one-celled, with no apparent septa separating the ovules into more than one compartment. The undivided punctiform stigma and the terete unmarked style would seem to bear out this conclusion. However, the ovaries were all rather flattened, making positive conclusions impossible.

Most closely allied to this species is *T. grandiosa*. These two species from a vegetative point of view appear identical. However, *T. grandiosa* can be separated by its habit (tree 12 m. high), the punctate-dotted under-surface of the leaves, the longer pedicels (1–2 cm. long), the long-ovate bracteoles (6–8 mm. long, 4 mm. wide), the profuse, deep glandular-denticulations along the margin with the indentations measuring nearly 0.5 mm., the larger petals and the two-parted style.

It is a pleasure to name this species in honor of Dr. H. A. Gleason, Curator of the herbarium of the New York Botanical Garden.

5. ***Ternstroemia discoidea*** Gleason in Bull. Torrey Bot. Club, **58**: 398. 1931.

Ternstroemia monosperma Gleason, op. cit. **58**: 399. 1931. Syn. nov.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Duida, slopes of Ridge 25, alt. 1700–1800 m., *G. H. H. Tate* 405 (TYPE, NY), Nov. 26, 1928 (bush 8 ft.; flowers white). — Mount Duida, Central Camp, alt. 1450 m., *G. H. H. Tate* 1019 (TYPE of *T. monosperma*, NY), Aug. 1928 – Apr. 1929.

Bush 3 m. with young branchlets verticillate, gray, angled, striate. Leaves coriaceous, elliptic-oblong or cuneate-oblong, 3.0–5.5 cm. long, 1.0–2.5 cm. wide, rounded and minutely retuse at apex, cuneate at base, the margin finely crenulate, the crenulations showing only near apex because of revolute sides, dark-punctate below, the midrib canaliculate above, raised below, the veins inconspicuous, the petiole 5–8 mm. long. Flowers solitary, crowded at base of the shoots of the season's growth; pedicel slender, recurved, up to 2.8 cm. long; bracteoles 2, minute, opposite or

alternate, one present immediately below the sepals and a second further down the pedicel, long-ovate, ca. 2 mm. long, glandular denticulate; sepals suborbicular 3–4 mm. long, 4–5 mm. wide, the outer lobes glandular-denticulate, the inner lobes with entire scarious margins; petals 5, broadly obovate, 5–6 mm. long, 3–4 mm. wide, joined at the base; stamens ± 100 , uni-seriate?, ca. 3 mm. long, their slender filaments joined at base, ca. 1.5 mm. long, adnate to base of corolla, the anthers linear, ca. 1.5 mm. long, the connective projected into a short apicule, 0.3–0.5 mm. long; ovary conical, flat, apparently single-celled; the style 2 mm. long, the stigma peltate. Fruit conical-ovoid, ca. 1.3 cm. long, 1-celled, 1- or 2-seeded, the seeds ovoid, 7 mm. long; fruiting calyx accrescent, the sepals enlarged to nearly 9 mm. width.

The angled, striate branchlets, the small, thick, cuneate leaves, the rounded sepals, small in anthesis, later accrescent, the peltate stigma, the one-celled ovary and the one- or two-seeded fruit all distinguish this species.

Great difficulty was experienced in obtaining a satisfactory dissection of the ovary. Each dissection showed only a minute slit for the cell of the ovary, with a rather thick wall. The fruit was considered by Gleason as only single-seeded, hence the name *T. monosperma* for the fruiting specimen. However, dissections show that the fruit can be two- as well as one-seeded. The accrescent calyx along with the one-seeded fruit were the basis of the species *T. monosperma*. Further study shows insufficient evidence for separating these two species.

6. ***Ternstroemia punctata*** (Aublet) Swartz, Prodr. Veg. Ind. Occ. 81. 1788. — Willdenow, Sp. Pl. 22: 1128. 1799. — Smith in Rees, Cyclop. 35: no. 4. 1817. — De Candolle in Mém. Soc. Phys. Hist. Nat. Genève, 1: 410 (Mém. Ternstr. 18). 1822; Prodr. 1: 523. 1824. — Sprengel, Syst. Veg. 2: 595. 1825. — Spach, Hist. Nat. Veg. 4: 62. 1835. — Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, 14: 105 (Mém. Ternstr. 17). 1855. — Wawra in Martius, Fl. Bras. 121: 270. 1886. — Melchior in Nat. Pflanzenfam. ed. 2: 21: 142. 1925.
- Taonabo punctata* Aublet, Pl. Guian. 1: 571. 1775; 4: t. 228. 1775. — Szyszyłowicz in Nat. Pflanzenfam. III. 6: 188. 1893.
- Ternstroemia revoluta* Splitgerber in Van Hoeven & De Vries, Tijdschr. 9: 99. 1842; in Bot. Zeitung, 1: 95. 1843.
- Ternstroemia punctata* (Aubl.) Swartz var. *revoluta* (Splitg.) Choisy in Mém. Soc. Phys. Hist. Nat. Genève, 14: 105 (Mém. Ternstr. 17). 1855. — Wawra in Martius, Fl. Bras. 121: 271. 1886. — Pulle, Enum. Pl. Surinam, 304. 1906.
- Mokofua punctata* (Aubl.) O. Kuntze, Rev. Gen. Pl. 1: 63. 1891.

DISTRIBUTION: British Guiana, Dutch Guiana, Venezuela, Brazil.

BRITISH GUIANA: Roraima, *R. Schomburgk* 600 (FM), 937 (G), 1842. — Upper Rupununi River, near Dadanawa, *J. S. De La Cruz* 1780 (FM, G, Mo, NY, US), July 1922 (8 ft. high). — Upper Mazaruni River, *J. S. De La Cruz* 2112 (FM, G, Mo, NY, US), 2216 (FM, G, NY, US), Sept.–Oct. 1922 (9–10 ft. high). — Malali, Demerara River, *J. S. De La Cruz* 2660 (G, Mo, NY, US), Oct.–Nov. 1922. — Kamakusa, Upper Mazaruni River, *J. S. De La Cruz* 2871 (G, NY, US), Nov. 1922. DUTCH GUIANA: Forest of Zandery, *J. A. Samuels* 471 (G, NY), May 31, 1936. VENEZUELA: Mount Auyan-Tepui, alt. 1100 m., *G. H. H. Tate s.n.* (NY) Dec. 1937 – Jan. 1938. BRAZIL: Upper Rio Negro River region, *Weiss & Schmidt s.n.* (NY), 1917–1918.

Small tree (3–8 m.) with twisted brittle, gray branchlets, not verticillate. Leaves heavy-coriaceous, obovate, 4–6 (–8) cm. long, 2–3 (–4) cm. wide, obtuse or rounded at the apex, emarginate, cuneate at the base, the

midrib canaliculate above, impressed the whole length of the leaf, raised below, the veins (8–11 pairs) raised on the upper surface obscure below, the margin entire, revolute, edged with glands, the under surface copiously dark-punctate, the petiole 3–5 mm. long. Flowers solitary axillary. Pedicels 2–3 cm. long, generally compressed with a row of glands along the angles (seen only under the microscope). Bracteoles 2, quickly caducous, ovate, ca. 6 mm. long, 3.0–3.5 mm. wide, concave, pergamentaceous, keeled, clearly glandular-denticulate along the margin, emarginate, apiculate at the apex, tapering at the base, leaving a small triangular scar when dropping. Calyx-lobes 5, ovate, subequal, 11–12 mm. long, coriaceous (1.5–2.5 mm. thick at base), abruptly long-acuminate, acumen 2 mm. long, distinctly glandular-denticulate on outer lobes, occasionally on inner lobes. Petals 5, ovate, ca. 6 mm. long, 3 mm. wide, membranaceous, long-acuminate, simulating calyx in shape. Stamens ca. 50, bi-seriate, filaments of unequal sizes 0.5–1.0 mm. long, joined at the base; anthers unequal, 1–2 mm. long in same flower, joined. Ovary conical, ca. 2 mm. diam., 3-celled, each cell ca. 3–4-ovulate, tapering at apex into style. Style 3-parted, 5 mm. long, free for 2 mm., parts of unequal length. Stigmas 3, punctiform. Fruit conical, rugose in drying, 3-celled.

The outstanding characters of this species are the entire punctate leaves with veins clearly evident on the upper surface, the long-acuminate petals and calyx-lobes, the latter unusually thick and starlike when expanded, the caducous bracteoles, leaving triangular scars, and the three-parted style and 3-celled ovary and fruit.

Choisy enumerated a var. *revoluta* based on *T. revoluta*. The characters of revolute margin and leaves crowded at apex are insufficient for even varietal delimitation. All species have a tendency toward revolute margins depending a great deal on the thickness of the leaf and the pressing and drying, and the crowding of leaves at the tip of the branchlets is a generic character.

7. ***Ternstroemia delicatula*** Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 106 (Mém. Ternstr. 18). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 273. 1886 (excl. spec. Weddell). — Krug & Urban in Bot. Jahrb. **21**: 536. 1896. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. — R. O. Williams, Fl. Trinidad & Tobago, **1**: 70. 1929.

Mokofua delicatula (Choisy) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo delicatula (Choisy) Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 118. 1893.

DISTRIBUTION: French Guiana, Trinidad.

FRENCH GUIANA: Cayenne, *Martin s.n.* (ISOTYPE, FM; photos, FM, G). TRINIDAD: Forests near Arima, alt. 600 m., *H. F. A. Eggers 1381* (NY, US).

This species is described as having membranaceous, obovate-elliptic leaves, narrowed at the base into a long petiole (6–15 mm.), obtuse or very shortly acuminate at the apex, 5–9 cm. long and 2–4 cm. wide, quite distinctly crenulate in the upper half, lateral nerves prominulous on both surfaces. The flowers are fairly numerous, crowded on the branchlets. The peduncle is slender, 1–2 cm. long, recurved. The 5 sepals are more or less equal, 5–6 mm. long, obtuse at the apex with eglandular entire margins. The ovary is globose-conical, 3-celled, contracted into a style ca. 4 mm. long which is topped by a subcapitate tri-crenate stigma. Each cell of the fruit is single-seeded.

The membranaceous leaves, the long petiole, the crowded flowers, the thin, recurved peduncle, the eglandular sepals and the tri-crenate subcapitate stigma are the distinguishing characters for identification.

8. ***Ternstroemia Browniana***, sp. nov.

Arbor 6 metralis, ramulis subverticillatis teretibus striatis griseis. Folia coriacea, obovata, 4–6 cm. longa et 1.5–2.5 cm. lata, apice roundata vel obtusa, basi in petiolum attenuata, margine crenulata, subrevoluta, costa supra canaliculata, subtus elevata, venis non visibilibus, petiolis 3–5 (–7) mm. longis. Flores [*Sandwich* 393] axillares, solitarii, pedicellis 2.0–2.5 cm. longis gracilibus; bracteolis 2, oppositis inaequalibus deltoideis vel ovatis ca. 3 mm. longis, 2.0 et 2.5 mm. latis, revolutis, margine glanduloso-denticulatis; sepala 5, imbricata, subaequalia, erecta vel recurva, ca. 5 mm. longa et 4 mm. lata, margine integerrima, scariosa; petala 5, subaequalia, 5–6 mm. longa et 2 mm. lata, basi 4 mm. connata, lobis obtusis orbicularibusque; stamina ca. 30, uni- vel bi-seriata, 4.0–4.5 mm. longa, filamentis crassis 0.5–0.8 mm. longis, basi connatis et ad corollam adnatis, antheris linearibus 2.0–2.5 mm. longis, connectivo 1 mm. vel minus projecto; ovarium conicum, ca. 2 mm. longum, 3-loculatum, loculis 1-ovulatis, stylo 25+ mm. longo, stigmatibus punctiformi. Fructus [*Hitchcock* 17306] globosus, ca. 1 cm. longus, 8–9 mm. diam., 3-loculatus, loculis 1-seminatis, stylo crasso 6 mm. longo, stigmatibus punctiformi; seminibus ca. 6 mm. longis. Fructus sepala 5–8 mm. longa et 4–5 mm. lata.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Rockstone, sandy scrub, A. S. *Hitchcock* 17306 (TYPE), NY; G, US), Dec. 31, 1919 – Jan. 1, 1920 (tree 20 ft. high). — Essequibo River, Moraballi Creek, near Bartica, in wallaba forest on sandy ridge, alt. near sea-level, N. Y. *Sandwich* 393 (NY, US), Oct. 7, 1929 (tall tree 78 ft. high, 8 in. diam.; sepals pinkish purple within; petals united, white, yellow at top; flowers very beautiful, fragrant like a sweet soap). — Northwest District, Barima River, lat. 8° 20' N., long. 59° 50' W., J. S. *De La Cruz* 3387 (FM, G, NY), Mar. 19–22, 1923 (10 ft. tall). — Malali, Demerara River, lat. 5° 35' N., J. S. *De La Cruz* 2666 (FM, G, NY), Oct. 30 – Nov. 5, 1922.

For some time the type of this species (*Hitchcock* 17306) has been known to be specifically different from *T. delicatula*, its nearest relative. Various workers have commented through annotations on the likenesses and differences, but no one described it as new. The name *T. Browniana* is selected in memory of the late Dr. N. E. Brown, formerly of Kew, who studied this specimen as well as many other collections from British Guiana.

Since *Hitchcock* 17306 is strictly a fruiting specimen, the above description of the flowering parts was drawn from *Sandwich* 393.

The resemblance to *T. delicatula* is found in the entire, scarious-margined, small (5 mm. long) calyx-lobes, the 3-celled ovary and fruit with a single ovule and seed to each locule, and the slender pedicel. The differences from *T. delicatula* lie in the punctiform rather than subcapitate, tri-crenate stigmas, the coriaceous veinless leaves, shorter and rounded at the apex and the shorter petiolate rather than the membranaceous, oblong-elliptic, delicately veined leaves, more acuminate at the apex and with petioles 10–15 mm. in length.

9. ***Ternstroemia alnifolia*** Wawra in Martius, Fl. Bras. 12¹: 275. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 142. 1925.

Ternstroemia alnifolia Wawra var. *lancifolia* Wawra, l. c.

Mokofua alnifolia (Wawra) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo alnifolia (Wawra) Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

DISTRIBUTION: Brazil.

No specimens examined.

Leaves obovate, 10–12 cm. long, 4–5 cm. wide, rounded or emarginate at apex, attenuate at base, the midrib impressed above, prominent below, ferrugineous and nigro-punctate below, veins ca. 7, the margin serrate-repandulate, the petiole ca. 1 cm. long. Flowers solitary, the peduncles 1.5–2.0 cm. long, usually erect; bracteoles minute, coriaceous, oblong, subacute, conspicuously glandular-denticulate; calyx-lobes coriaceous, ca. 1 cm. long, the outer lobes oval, glandular, the inner lobes orbicular, entire; petals three-fourths as long as sepals, connate at base, concave, connivent before anthesis, narrowed at base; stamens bi-seriate, three-fourths as long as petals, the filaments flat, wider than the anthers, very short, the anthers linear-oblong, nearly five times longer than the filaments, truncate at apex with a short mucron; ovary ovoid, somewhat 3-sided, sulcate due to the impression of stamens, 3-celled (or 5–6-celled), 2 ovules in each cell or if 6-celled, 1-ovulate, the style short, hardly equalling the ovary in length, thick, 3–5-angled, the stigma orbicular, tri-crenate, lobes often bi-sulcate. Fruit globose, ca. 1.5 cm. long, the seeds oblong-obovate, 8 mm. long.

Although no material has been available for the study of this species and even though it is closely allied to and invades the range of *T. brasiliensis*, there can be no doubt of its status. The outstanding characters are (1) the very short tri-partite style and peltate stigmas; (2) the 3-celled (or 5–6-celled) ovoid ovary; (3) the truncate stamens; (4) the glandular bracteoles and outer calyx-lobes and (5) the leaves nigro-punctate below.

Listed in the Index Kewensis is *Taonabo ulmifolia* Szyszyłowicz but not *Taonabo alnifolia* Szyszyłowicz. Since Szyszyłowicz did not include the former in his work, one may assume that *T. ulmifolia* is merely a typographical error for *T. alnifolia*.

10. *Ternstroemia brevistyla*, sp. nov.

Ramuli grisei, teretes. Folia coriacea, obovata vel elliptica, 3.0–5.5 cm. longa et 2.0–3.2 cm. lata, apice rotundata, rare retusa, basi late cuneata, margine plana ad apicem crenulata, costa supra leviter impressa, subtus leviter elevata, undique ad apicem evanida, nervis non visibilibus, petiolis 4–8 mm. longis. Flores non visi. Fructus solitarii, axillares, subglobosi, ca. 7 mm. longi et 5–6 mm. lati, 3-loculati (rare 4-loculati) loculis 1-seminatis; pedicellis 6–8 mm. longis; bracteolis 2, inaequalibus, oppositis, suborbicularibus vel late ovatis, 2.5 × 2 mm. vel 3 × 3 mm., margine glanduloso-denticulatis; sepala 5, imbricata, suborbicularia, 4–6 mm. longa et ca. 5 mm. lata, exterioribus sparse glanduloso-denticulatis, interioribus margine scariosis; stylo breve 1 mm. vel minus longo, sulcato, stigmate subcapitato, 3-crenato.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Auyan-Tepui, alt. 1100 m., G. H. H. Tate 1149 (TYPE, NY; US), Dec. 1937 – Jan. 1938.

This species is most closely related to *T. discoidea*. However, from this latter species it can be separated by the very brief style, the 3-celled fruit

and the tri-crenate, subcapitate stigma. The only feature of resemblance is the leaf.

Ordinarily the fruit of *T. brevistyla* is 3-celled and the stigma tri-crenate. Occasionally, the fruit is 4-celled and when such is the case, the stigma is 4-crenate. The very brief style is probably the shortest among the American species.

11. *Ternstroemia penduliflora*, sp. nov.

Arbor 9 m. metralis (fide coll.), ramis teretibus griseis, ramulis teretibus griseo-brunneis. Folia membranacea (juvenilia), elliptica vel obovata, 12–16 cm. longa, 2.5–4.5 cm. lata, undique opaca, apice acuminata, basi longa attenuata, margine plana et subcrenulata, costa supra canaliculata apice evanida, subtus conspicua, venis 20–30 paribus ramosis haud conspicuis, petiolis circa 1.5 cm. longis. Flores solitarii, proxime positi, pedicellis gracilibus pendulis circa 4 cm. longis rubro-brunneis; bracteolis 2 oppositis inaequalibus ovatis 5–8 mm. longis et 2.5–3.0 mm. latis, distincte longeque acuminatis, margine integerrimis; sepala 5, late obovata, 7–10 mm. longa et 2.5–3.0 mm. lata, apice rotundata vel subtruncata, rostrata margine exterioribus sparse glanduloso-denticulatis, interioribus scariosis; petala 5, oblongo-obovata, circa 8 mm. longa, 3–4 mm. lata, 4 mm. connata, apice truncata vel rotundata, margine crenulata; stamina circa 40, uniseriata, 5–6 mm. longa, apiculata, filamentis 1 mm. minusve longis, basi connatis, ad corollam adnatis, antheris linearibus circa 3 mm. longis, apiculis 1 mm. plusve longis; ovarium conicum, sulcatum, circa 3 mm. longum 3-loculatum, loculis 2 plusve ovulatis, stylo ca. 3 mm. longo, stigmate punctiformi. Fructus non visus.

DISTRIBUTION: Peru.

PERU: Dept. Loreto, Mishuyacu, forests near Iquitos, alt. 100 m., *G. Klug* 1487 (TYPE, NY), May–June 1930 (tree 9 m. high; flowers white and rose).

The outstanding characters of this species are: (1) the long, membranaceous, acuminate many-nerved leaves; (2) the long (4 cm.) pendulous graceful pedicels, closely arranged on the axis; (3) the long (up to 8 mm.) ovate, distinctly acuminate bracteoles; (4) the truncate petals (8 mm. long), joined one-half their length; (5) the stamens (5–6 mm. long) with apicules usually longer than the filaments; (6) the 3-celled ovary and the punctiform stigma.

Closely allied to this species and known from the same type locality is *T. Klugiana*. Features of *T. penduliflora* separating it from the latter are the long pendulous pedicels, the larger membranaceous leaves, the longer, acuminate bracteoles and larger sepals and the 3-celled ovary.

The leaves on the type specimen are truly membranaceous, but they are apparently very young. It is highly probable that on maturity these leaves will become coriaceous.

12. *Ternstroemia Candolleana* Wawra in Martius, Fl. Bras. **12**¹: 373. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. — Gleason in Bull. Torrey Bot. Club, **58**: 395. 1931.

Taonabo Candolleana (Wawra) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 188. 1893. *Ternstroemia Candolleana* Wawra var. *rotundata* Wawra in Martius, Fl. Bras. **12**¹: 274. 1886.

DISTRIBUTION: Brazil.

BRAZIL: State Amazonas, Rio Negro, near Barra, *R. Spruce 1544* (ISOTYPE, G, NY; photo FM), July 1851. — Same locality, *L. Riedel 1593* (ISOTYPE G; fragment FM). — Muyrapenima, river banks and flood sands on the Rio Negro, *G. H. H. Tate 61* (NY, US). — Along Guiana river above the mouth of the Casiquari river, *R. Spruce 3496* (ISOTYPE of var. *rotundata*, G, NY; fragment & photo FM).

Leaves chartaceous to subcoriaceous, oblong-obovate, 7-10 cm. long, 1.5-3.0 cm. wide, acuminate to obtuse at the apex tapering gradually at base into petiole, shining above, ferrugineous below, 7-8 pairs of veins hardly perceptible, the margin plane to subrevolute, entire to subcrenulate, the petiole 1 cm. long. Flowers solitary, the pedicels 2-4 cm. long, filiform; bracteoles 2, opposite unequal, 5-8 mm. long, ovate-lanceolate, acute, the second bracteole shorter ovate; calyx-lobes 5, imbricate, ca. 1 cm. long in flower, 0.7 cm. wide, obtuse at apex, as much as 1.3 cm. long and 1 cm. wide in fruit, the margin scarious, not glandular-denticulate; corolla 9 mm. long, fused at base into a tube 4 mm. long, the petals 5, ovate, subacute; stamens 50, bi- or tri-seriate, caudate, the filaments 1 mm. long, connate at base and adnate to corolla, the anthers 4 mm. long, linear; the cauda 2 mm.⁺ long; ovary subconical, 2 mm. diam., 3-celled, each cell 2-ovulate; style long for the genus (7-11 mm.); stigma punctiform. Fruit ovate or subconical, sulcate, 1.0-1.5 cm. long, 3-celled, usually 6-seeded; seeds 6-8 mm. long.

The outstanding characters of this species are: (1) the corolla fused for one-half its entire length into a tube; (2) the large calyx-lobes (up to 1.5 cm. in fruit); (3) the elongated style (up to 11 mm.); (4) the long-caudate stamens, the cauda 2 mm. or more long.

12A. *Ternstroemia Candolleana* Wawra var. *angustifolia* Wawra in Martius, Fl. Bras. **12**¹: 274, 1886. — Gleason in Bull. Torrey Bot. Club, **58**: 395, 1931.

DISTRIBUTION: Brazil.

BRAZIL: Camanáos, flooded grounds on the Rio Negro, *G. H. H. Tate 125* (NY, US).

In floral characters, this variety matches the species most accurately and because of the elongated style, large calyx-lobes and the filiform pedicel must be retained in close association. The leaves, however, are most distinctive for the genus. They are submembranaceous, long-linear, 8-13 cm. long and seldom exceed 1.5 cm. in width, taper gradually at both ends and along the margin are plane and slightly crenulate toward the apex.

13. *Ternstroemia subcaudata*, sp. nov.

Arbor vel frutex 3-9 metralis, ramulis rugosis teretibus griseis. Folia coriacea vel subcoriacea, oblongo-ovata, 6.5-8.5 cm. longa et 1.5-2.7 cm. lata, apice longo-acuminata vel subcaudata, basi in petiolum attenuata, margine integerrima et plana, costa supra impressa, subtus elevata, venis obscuris, petiolis 1.0-1.5 cm. longis. Flores solitarii, pedicellis gracilibus 1.0-1.5 cm. longis, bracteolis 2 suboppositis inaequalibus ovatis 0.7-1.4 mm. longis et circiter 1 mm. latis acuminatis, margine glanduloso-denticulatis; sepala 5, imbricata, inaequalia, 3.0-4.5 mm. longa, 2.5-4.0 mm. lata, exterioribus lato-ovatis brevioribus crassioribusque, margine scarioso-fimbriatis (non glanduloso-denticulatis), interioribus suborbicularibus, margine scariosis; petala 5, ovata, basi ad medium connata, 4-5 mm. longa, margine scariosa; stamina circiter 35, uni-seriata, inaequalia, 3-4 mm. longa, filamentis crassis 1 mm. vel minus longis, basi connatis et ad

corollam adnatis, antheris circiter 1.5 mm. longis oblongis, connectivo longo-caudato 1 mm. vel plus projecto; ovarium conicum vel subglobosum, circiter 1.5 mm. longum, 3-loculatum, loculis 1-ovulatis, stylo crasso circiter 2.5 mm. longo, stigmate punctiformi. Fructus ignotus.

DISTRIBUTION: Brazil.

BRAZIL: State Amazonas, Rio Negro, near Manáos, *E. Ule* 8921 (TYPE, US), August 1910 (tree or shrub 3–9 m.; flowers reddish yellow).

The subcaudate coriaceous leaves with obscure veining, the long-caudate connective in the stamens and the punctiform stigma are characters of importance in distinguishing this species and separating it from its nearest relative, *T. delicatula*. These two species are allied by the three-celled ovary with a single ovule in each cell.

14. **Ternstroemia Schomburgkiana** Benth in Hooker, London Jour. Bot. **2**: 362. 1843. — Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 105 (Mém. Ternstr. 17). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 272. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Mokofua Schomburgkiana (Benth) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo Schomburgkiana (Benth) Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 188. 1893.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Dry savannahs near Roraima Mt., *R. Schomburgk* 967 (photo, FM, G).

Branchlets grayish, terete, comparatively smooth, sometimes verticillate. Leaves coriaceous, obovate, up to 7 cm. long and 3 cm. wide, obtuse or rounded at apex, obtusely cuneate at base, entire or inconspicuously serrulate, ca. 8 pairs of veins evident only on the upper surface, punctate below, the petiole 6–7 mm. long. Flowers 4–5-aggregate at the tips of the branchlets; pedicels 7–8 mm. long; bracteoles ovate, ca. 1.5–2.0 mm. long, apiculate, glandular-denticulate; calyx-lobes ovate, acute, 5–6 mm. long, glandular-denticulate; petals acute, equalling the calyx-lobes in length; stamens uni-seriate, ca. 20, shorter than the petals, the filaments very short, thick; ovary (fide Wawra) 3-celled, the cells 3–4-ovulate, the style longer than the ovary.

The foregoing description is based upon those of Benth (1843) and Wawra (1886) along with a photograph of *Schomburgk* 967 in the Berlin herbarium. There are discrepancies between Benth's original description and Wawra's interpretation. Not only do Wawra's measurements vary considerably from those of Benth, but he also misinterprets those of Benth. Wawra states that Benth recorded the pedicel length as 2 cm. Actually, Benth states that the pedicels are 4 lines long, which when metrically interpreted would be 8 mm. Wawra states that the bracteoles are 5 mm. long, the calyx-lobes 1 cm. long and that the latter are rounded (key). Examination of the photograph shows the bracteoles to be only 1–2 mm. long, at the most, and the calyx-lobes acute and 5–6 mm. long.

Cited here questionably might be *Pinkus* 281 (FM, Mo, NY, US), collected in British Guiana, Feb. 3, 1939 on the Arubaru River (Kako tributary), upper Mazaruni drainage, near Haiamatipu Mt., alt. 600 m. (shrub

on marshy savannah; petals white, pink tinged; fruit yellow). This specimen agrees with the original description and the photograph of the type in all details, except that it possesses a 2-celled rather than a 3-celled ovary.

15. **Ternstroemia brasiliensis** Cambessèdes in A. St. Hilaire, Fl. Bras. Mer. **1**: 298, t. 59. 1827. — Spach, Hist. Nat. Veg. **4**: 61. 1835. — Walpers, Repert. Bot. Sept. **1**: 369. 1842. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 105 (Mém. Ternstr. 17). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 271. 1886; in Warming, Symb. Fl. Bras. Centr., Pt. 32. 880. 1889. — Usteri, Fl. Sao Paulo, 205. 1911. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Ternstroemia brasiliensis var. *minor* Cambessèdes in A. St. Hilaire, Fl. Bras. Mer. **1**: 298. 1827.

Ternstroemia brasiliensis var. *parvifolia* Wawra in Martius, Fl. Bras. **12**¹: 272. 1886.

Mokofua brasiliensis (Cambessèdes) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo brasiliensis (Cambessèdes) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 188. 1893.

DISTRIBUTION: Brazil.

BRAZIL: Rio de Janeiro. *L. Riedel* 79 (G, NY); 1412 (US). — *Wilkes U. S. Expl. Exped. s.n.* (US). — *A. Glaziov* 8278 (AA, NY), 13566 (AA, FM, NY), Feb. 29, 1932 (tree). — Capirari, fields, *A. St. Hilaire s.n.* (type of var. *minor*, photo and fragment, FM). Minas Geraes: *I. F. Widgren* 137 (US), Dec. 11, 1845. — *A. F. Regnell s.n.* (US). — Ouro Preto, Campo Grande, Serra de Ouro Preto, Campoeira em pedras, *M. Barreto & J. Badini* 9142 (FM), Aug. 15, 1937 (tree 3 m.). — Serra da Piedade, Caeté, campo, *M. Barreto* 5442 (FM), May 6, 1934 (tree 2 m.). — Barbacena, fields, *A. St. Hilaire s.n.* (TYPE, photo FM) (fl. December). — Lagoa Santa, *E. Warming s.n.* (FM, US). — Jacarehý, in forest, *P. Dusen* 16114 (Mo) or 16144 (G). — Precise locality lacking, *F. Sello* 52 (G).

Small trees or shrubs. Leaves coriaceous, oblong-obovate to lanceolate, 6–13 cm. long, 2.0–4.5 cm. wide, obtuse at apex, tapering at base into petiole, opaque, green above, yellowish green below, granular punctate, upper half subentire or serrulate, revolute, 7–9 pairs of veins somewhat conspicuous above, the petiole 1.0–1.5 cm. long. Flowers axillary, usually solitary, the peduncles seldom over 2.5 cm. long; bracteoles 2, opposite, 2–4 mm. long, ovate or rounded, glandular-denticulate, keeled; calyx-lobes 5, imbricate, suborbicular to broadly ovate, concave, pergamentaceous, unequal, the outer lobes smaller, 6–7 mm. long, 5–7 mm. wide, glandular-denticulate, the inner lobes 8–9 mm. long, 7–8 mm. wide, the margin scarious; petals 5, ovate, 8 mm. long, 3–5 mm. wide, joined for 3 mm.; stamens ca. 45, bi-seriate, the filaments ca. 1.5 mm. long, compressed, adnate, the anthers linear, ca. 5 mm. long, apiculate; ovary globose, ca. 4 mm. diam., usually 3-celled, occasionally incompletely 5–6-celled, the locules usually 2-ovulate, the style sturdy, ca. 5 mm. long, somewhat compressed, the stigma punctiform with 3 distinct circular stigmatic surfaces (visible only under binoculars). Fruit globose to ovoid, up to 1.5 cm. long, primarily 3-celled, may appear 4–5–6-celled, few seeded, often one to each locule.

Closely allied, if not identical, is *T. venosa* Sprengel. Clearly described by Sprengel, *T. venosa* has been ignored by all botanists or classified as dubious or "little known." It cannot be considered a dubious species since it was the first species of this genus described from eastern Brazil. It may be that the type collected by *C. F. Otto* has been lost or destroyed. However, Sprengel later cited a second specimen collected by *F. Sello*. At any rate, it seems that no botanist dealing with the genus has made much

of an effort to see the type of this species. A few features of *T. venosa* may, at first, seem alien to *T. brasiliensis*. The leaf is described as lanceolate. *Widgren 137* has typically lanceolate leaves. Sprengel describes the fruit as two-celled, eight-seeded. *Barreto 5442* has fruit which, when sectioned near the apex, is two-celled, and when sectioned near the base appears four-celled. Incidentally, although Cambessedes describes the fruit as three-five-celled, his illustration shows a four-celled capsule. The fruit of *Barreto & Badini 9142*, when sectioned near the apex, appears two-celled, lower down it appears three-celled in section and near the base incompletely six-celled. *Riedel 327* in fruit is three-celled, six-seeded. On the same specimen are fruits that are five-celled (probably incompletely so), also six-seeded. These variations are not unusual in the genus.

Sprengel in describing *T. venosa* states "pedunculi axillares, aggregati, brevissimi" and "Corolla quinquepartita, calyce duplo longior." In *T. brasiliensis*, the peduncles are solitary and ca. 2.5 cm. long and the corolla is only slightly longer than the calyx. Wawra (1886) also refers to the pedicels as aggregate. In the material examined by me, the pedicels are always solitary. If Sprengel were comparing the corolla lobes with the outer calyx-lobes, his statement concerning the corolla length might be applied to *T. brasiliensis*.

If these two species prove to be identical, as seem likely, the name *T. venosa* Sprengel (1821) must be retained in place of *T. brasiliensis* Cambessedes which was described in 1827, six years later.

16. ***Ternstroemia globiflora*** Ruiz & Pavon, Syst. Veg. Fl. Peruv. Chil. 179. 1798. — De Candolle in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 412 (Mém. Ternstr. 20). 1822; Prodr. **1**: 524. 1824. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 104 (Mém. Ternstr. 16) 1855.

Ternstroemia globuliflora Steudel, Nom. Pl. ed. 2, **2**: 669. 1841. Sphalm.

Ternstroemia globosa Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 104 (Mém. Ternstr. 16). 1855.

Ternstroemia minoriflora Hochreutiner in Ann. Conserv. & Jard. Bot. Genève, **20**: 192. 1917. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

DISTRIBUTION: Peru.

PERU: In Andium silvaticis frigidis versus Pillao vicum, *J. Pavon s.n.* (TYPE, Madrid; fragment & photo, FM). — Without locality, *J. Pavon s.n.* (photo of specimen labeled *T. globosa*, Geneva; FM). — Without locality, *J. Pavon s.n.* (type of *T. minoriflora* Geneva; fragment & photo, FM). — Dept. Ayacucho, Aina, between Huanta and Río Apurimac, open woods, alt. 750–1000 m., *E. P. Killip & A. C. Smith 22552* (US), May 1929 (tree 30–40 ft. with white fleshy petals). — Dept. Libertad, Prov. Patáz, valley of the Mishiollo River below Ongóu, alt. 1300 m., *A. Weberbauer 7064* (G, US), Aug. 1914 (shrub 5 m. high with pale yellow flowers).

Small tree or shrub. Leaves broadly lanceolate, elliptic or obovate, often asymmetrical, subcoriaceous, acuminate or subacuminate at apex, cuneate at base, 6–8 pairs of veins visible on lower surface, the margin plane, entire, the petiole 5–7 mm. long. Flowers rather small, axillary, solitary; pedicels 0.7–1.8 cm. long, compressed; bracteoles 2, opposite rounded or triangular 1–2 mm. long, not glandular-denticulate; calyx-lobes 5, suborbiculate, the outer two smaller, 2.5–3.0 mm. long, the inner three 4–5 mm. long, scarious margined not glandular-denticulate; corolla white or pale yellow, gamopetalous, calyptrate, globose, ca. 3 mm. long,

nearly cleistogamous, the wall 1 mm. thick, 5 minute lobes at apex, imbricate, suborbicular, less than 1 mm. long; stamens 10–16, adnate to base of corolla, uni-seriate, not over 2 mm. long (over all), the filaments various lengths, 0.5–2.0 mm. long, fused sometimes their entire length swelling at center, decreasing near apex, with two anthers appearing at apex, the anthers minute usually ovate, ca. 0.5 mm. long, two-celled, basifixed; ovary conical, sulcate, ca. 1 mm. long, 1.5 mm. diam. at base, two-celled, 1–2-ovulate, ovules attached at apex, the ovary tapering through style (1 mm. long) into a punctiform stigma. Fruit ovate, ca. 1 cm. long and 1 cm. diam., the seeds 2–3, buff colored, covered with reddish-brown mealy coating, ca. 9 mm. long and 5 mm. diam.

At my disposal were fragments and photographs of the types of both *T. globiflora* and *T. minoriflora*. Of the former, one flower bud was available. There is no doubt that the two are synonymous. Fortunately, the two other specimens cited above (*Weberbauer 7064* and *Killip & Smith 22552*) furnished flowers and fruit for dissection. I was most anxious to dissect the flower after reading Hochreutiner's excellent treatment under *T. minoriflora*. The globose, calyptrate, nearly cleistogamous corolla is a most unusual character in the genus. Ruiz & Pavon undoubtedly recognized this character when they utilized the name *T. globiflora*, but their description was so simple and incomplete that botanists were unable to associate unnamed material with the species. However, after Hochreutiner's enlightening treatment, one can see in Ruiz & Pavon's description, "corollis globosis quinquedentatis" that the two authors really understood the significance of their species as against *T. quinquepartitis* "corollis quinquepartitis," the latter expression causing considerable controversy. Both species were either dropped or ignored by most authors until now.

In the eyes of some workers this species might constitute the basis for a new genus. However, many species in the Theaceae in early flower present the same globose appearance of the corolla. Often, it is impossible to separate the corolla-lobes, so tightly do they overlap in the bud. In this species, the lobes are thicker and a nearly complete coalescence has actually taken place.

17. ***Ternstroemia congestiflora*** Triana & Planchon in Ann. Sci. Nat. sér. 4, **18**: 259. 1862. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Mokofua congestiflora (Triana & Planchon) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo congestiflora (Triana & Planchon) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

DISTRIBUTION: Colombia.

COLOMBIA: Dept. Boyaca, vicinity of Tunja, *Purdie s.n.* (ISOTYPE, G). — Precise locality unknown, *J. C. Mutis 1116* (US).

Branchlets terete, thick subverticillate. Leaves heavy-coriaceous, oblong-obovate to oblong-elliptic, 5–8 cm. long, 2–3 cm. wide, obtuse, emarginate at apex, cuneate at base, 7–8 pairs of branching veins distinct on lower surface, the margin entire or subcrenulate near apex, revolute or subrevolute, the petiole 4–7 mm. long. Flowers axillary, solitary, the pedicel 4–5 mm. long in type (2 cm. in *Mutis 1116*), sturdy, 2 mm. diam.; bracteoles 2, opposite, ca. 3 mm. long, 4 mm. wide, obtuse, rounded at apex,

scarious margined, not glandular-denticulate, keeled on dorsal surface; calyx-lobes imbricate wider than long, 5–6 mm. long, 6–7 mm. wide, orbicular, scarious-margined, not glandular-denticulate, concave, pergamentaceous; corolla lobes ca. 8 mm. long, 6 mm. wide, obtuse at apex; joined at base by thick band 1 mm. or more wide; stamens ca. 60, 4.0–4.5 mm. long, the filaments 2–3 mm. long, the anthers oblong, 1.5–2.0 mm. long; ovary subconical, ca. 4 mm. diam. near base, 2-celled, few-ovulate; style short, stocky, 2.5–3.0 mm. long, 1 mm. diam.; stigma decidedly bi-crenate, involute. Fruit not seen.

Outstanding characteristics of this species are the thick, sturdy branchlets, the heavy-coriaceous leaves, the branching veins clearly distinct on the lower surface, the globose corolla and, in the type, the very short pedicels.

The corollas appear globose, similar to those of *T. globiflora* R. & P. from Peru. The calyx-lobes are extremely concave and fail to turn back at maturity. Of all the flowers examined, none were found in which the corolla had actually opened. Even though the calyx-lobes were spread the corolla appeared as a small globe, not with minute lobes at the apex as in *T. globiflora* but with the petals compactly compressed. The outline of the outer petal can be discerned, but unlike most species, one cannot tease the petals open. Frankly, I doubt if the petals ever open. The whole corolla can easily be lifted intact from the ovary and stigma. At the base, the corolla is thickened for a millimeter or more in length as though bound by a rubber band. The stamens adhere to the walls of the corolla.

The ovary is thicker than in most species, 4 mm. in diameter. The style is also thickened and the stigma is crenately two-lobed. In the type the pedicel is very short, 5 mm. or less. However, in the fragmentary *Mutis 1116* the pedicel is approximately 2 cm. long. This is the only difference between the two specimens.

18. *Ternstroemia distyla*, sp. nov.

Ramuli subverticillati, grisei, teretes. Folia coriacea, elliptico-lanceolata, 4.5–6.5 cm. longa et 1.0–1.5 cm. lata, apice basique acuta, margine plana vel subrevoluta, distincte denticulata, subtus punctata, costa supra canaliculata, subtus leviter elevata, nervis non visibilibus, petiolis 5–7 mm. longis. Flores non visi. Fructus (probabiliter immaturus) solitarius, conicus, ca. 5–8 mm. longus et basi 5–7 mm. diam., 2-loculatus, pauci-seminatus (ca. 4), pedicellis gracilibus saepe recurvatis 1.3–1.7 cm. longis, bracteolis 2 oppositis ovatis 1.5–2.0 mm. longis et ca. 1.5 mm. latis, margine sparsissime glanduloso-denticulatis; sepala 5, imbricata, semiorbicularia, 3–5 mm. longa et ca. 4 mm. lata, apice rotundata vel obtusa, exterioribus sparsissime glanduloso-denticulatis, interioribus integerrimis; stylo persistente brevissime ca. 1 mm. longo 2-partito ad basim libero, stigmatibus 2 subcapitato-reniformibus.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Auyan-Tepui, alt. 1850 m., *G. H. H. Tate s.n.* (NY, TYPE), Dec. 1937 – Jan. 1938.

This species, although the type presents only immature fruit, is distinct because of the very short, persistent style which in most instances is two-

parted to the base. The elliptic-lanceolate leaves, distinctly crenulate, is another unusual character.

19. ***Ternstroemia tristyla*** Gleason in Bull. Torrey Bot. Club, **58**: 398. 1931.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Duida, Brocchinia Hills, alt. 1350 m., *G. H. H. Tate 584* (TYPE, NY), Jan. 4, 1929 (sepals involute, dull pink).

Branchlets terete, gray. Leaves coriaceous, cuneate, sessile, 2.5–3.0 cm. long, 1.0–1.3 cm. wide, rounded to a minutely retuse apex, cuneate at base, the margin subrevolute with minute glandular teeth, veinless except for an inconspicuous midrib, plane above and slightly raised below. Flowers solitary axillary; pedicels compressed, ca. 1.5 cm. long; bracteoles 2, opposite, chartaceous, oblong-linear, ca. 5 mm. long, 1.25 mm. wide, carinate, glandular-denticulate; sepals 5, imbricate, long and sharp-pointed, involute, 13–15 mm. long, ca. 5 mm. wide at base, pergamentaceous, the outer-lobes sparsely glandular-denticulate; petals 5, imbricate, long-acuminate, resembling calyx in shape, involute, 7–9 mm. long, 2.5–3.0 mm. wide, free nearly to the base; stamens bi-seriate, ca. 35, unequal, 2.5–4.0 mm. long in same series, the filaments variable, 0.5–2.0 mm. long in same series, thick and short to long and slender, connate, adnate to base of corolla, the anthers oblong-linear, 1.5–2.0 mm. long, the connective projected into an acumen up to 0.5 mm. long; ovary very short, rather broad-flattened, 2-celled, each cell 5–6-ovulate, the style 7 mm. long, 2-parted for 3 mm., the 2 pistils punctiform. Fruit not seen.

Following is an enumeration of the outstanding characters of this species: (1) leaves cuneate and sessile, veinless and glandular-margined; (2) style distinctly 2-parted for nearly one-half its 7 mm. length; (3) bracteoles semi-foliaceous, 5 mm. long; (4) sepals and petals long-acuminate and involute, tapering nearly their entire length to sharp pointed apices.

From my study, it appears that *T. tristyla* is an unfortunate name for the species. On the type specimen were two flowers, one of which I carefully boiled and dissected. In a packet on the herbarium sheet were fragments of former dissections. In all, there were styles of four flowers available for observation. These were carefully examined under a high-powered binocular and in each case the style proved to be 2-parted with no evidence of a third part having broken off. To substantiate the observation, the ovary in the flower which I dissected proved to be clearly 2-celled with 5 ovules in one cell and 6 in the second cell. The style is free-parted for less than one-half its entire length and hence should be considered a single style, two-parted at the apex.

In floral characters this species is identical with *T. pungens* Gleason. The sessile, smaller cuneate leaves only sparsely punctate below are the only features separating the two species.

20. ***Ternstroemia grandiosa***, sp. nov.

Arbor 12 metralis, ramulis crassis teretibus griseis. Folia crasso-coriacea, oblongo-obovata, 13–19 cm. longa et 5–8 cm. lata, apice obtusa, abrupte acuminata, basi late cuneata, subtus punctata, margine subintegerrima, pauce glandulosa-denticulata, subplana, costa supra canaliculata, subtus elevata, venis 18–20 paribus supra obscuris, subtus subconspicuis, petiolis

crassis, 1.5–2.5 cm. longis. Flores solitarii, pedicellis 1–2 cm. longis, bracteolis 2 inaequalibus longo-ovatis vel lato-ovatis, $6 \times 3\text{--}4$ mm. et 8×4 mm., margine glanduloso-denticulatis; sepala 5, imbricata, crassa, ovata vel lato-ovata, inaequalia, 9–12 mm. longa et 7–10 mm. lata, exterioribus margine profunde glanduloso-denticulatis, interioribus margine scariosis; petala 5, lanceolata, 9–10 mm. longa et ca. 3 mm. lata, longo-acuminata, basi 5 mm. connata, apice revoluta; stamina ca. 20, ut videtur uni-seriata, inaequalia, crassa sed fragilia, filamentis crassis 1–2 mm. longis, antheris linearibus ca. 3 mm. longis, connectivo ca. 1 mm. projecto; ovarium subconicum, ca. 2 mm. longum et basi 2 mm. diametro, 2-loculatum, loculis 2-ovulatis, stylo 2-partito, ca. 6.5 mm. longo, apice ad 2 mm. plusve libero, stigmatibus 2 punctiformibus. Fructus ignotus.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Upper Mazaruni District, trail leading to Kamarang from the Kurupung River, on rocky soil, *A. S. Pinkus* 4 (TYPE, NY; US), Sept. 13, 1938 (tree 40 ft. high; trunk 8 in. diam.; flowers flesh-colored).

This species is characterized by the following: (1) tree 12 m. high; (2) thick-coriaceous leaves, punctate on the lower surface; (3) deeply glandular-denticulate outer calyx-lobes; (4) long-acuminate petals, 9–10 mm. long; (5) few stamens (20); (6) long two-parted style.

Most closely related to this species is *T. Gleasoniana*, agreeing in the very large leaves which, however, are thicker, smoother in texture and distinctly free from punctations on the lower surface. As another distinguishing feature, *T. Gleasoniana* has flowers with glandular-denticulate bracts at the base of the pedicels. The sepals of the latter are suborbicular, at least the outer lobes, and are only sparsely glandular-denticulate. The style, in the latter species, is definitely entire.

21. *Ternstroemia Krukoffiana*, sp. nov.

Arbor 20 metralis (fide Krukoff). Folia coriacea, oblongo-obovata vel oblongo-elliptica, 12–20 cm. longa et 4–5 cm. lata, apice obtusa, abrupte acuminata, basi longo-attenuata in petiolum 2.0–3.5 cm. longum, margine leviter glandulosa ut videtur integerrima, plana vel leviter revoluta, costa supra canaliculata, venis 12–16 paribus supra manifestis subtus obscuris. Flores non visi. Fructus maximus, ovalis vel globoso-ellipticus, 4.0–5.5 cm. longus et 3.5–4.0 cm. diam., biloculatus, loculis solitario-seminatis, seminibus eis *Amygdali* similibus, pulpa carnosa indurata asperatis, ca. 3 cm. longis et 1.5 cm. latis. Pedicelli axillares, solitarii, 2–3 cm. longi, crassi, lignosi, 4 mm. diam., bracteis 2 oppositis 4–5 mm. longis, margine scariosis. Sepala 5, imbricata, pergamentacea, obovata, 8–10 mm. longa et 7–8 mm. lata, margine scariosa, non glanduloso-denticulata.

DISTRIBUTION: Brazil.

BRAZIL: State of Amazonas, Municipality Humayta, on plateau between Rio Livramento and Rio Ipixuna, terra firma, *B. A. Krukoff* 7180 (TYPE, AA; ISOTYPE, FM, NY), Nov. 7–18, 1934 (tree 70 ft.).

Probably the largest fruit of the genus, at least in the Americas, is found in this species (4.0–5.5 cm. long, 3.5–4.0 cm. wide). Furthermore, only one or two seeds are produced. These seeds (when two) fill the fruit case, one to each cell, appear quite similar in appearance to the seed of the almond, and are covered with a reddish brown pulp. Upon drying this

pulp shrinks and cracks into hardened portions which, in turn, appear almost as a crusty stellate pubescence. Whereas in other species this covering is quite powdery or mealy and can be rubbed off easily with the finger, in this species it can be removed only with the aid of a knife or some other sharp implement.

For a species with such unusually large fruit, the calyx-lobes are comparatively small, usually less than 1 cm. long and 7–8 mm. wide. The leaves are oblong-obovate to oblong-elliptic, abruptly acuminate at the apex and tapering gradually at the base into a petiole 3 cm. long, which appears considerably longer because of the extensive tapering of the leaf base.

Most closely allied is *T. macrocarpa* Tr. & Pl., which can be separated from the present new species by: (1) smaller fruit (up to 2.5 cm. long, 2 cm. wide) with 16–18 flat, smooth grayish seeds (7–8 mm. long); (2) shorter and wider leaves abruptly cuneate at the base with 9–11 pairs of veins; (3) much larger calyx-lobes, up to 20 mm. long, 11–14 mm. wide.

It is a pleasure to name this species for Mr. B. A. Krukoff, whose extensive collections in South America and whose interest in the flora of that region are well known.

22. ***Ternstroemia pachytrocha*, sp. nov.**

Habitus ignotus. Folia crasso-coriacea, late elliptica vel obovata, 6–8 cm. longa et 3.5–4.5 cm. lata, apice rotundata, subinde subretusa, basi obtusa, in petiolum attenuata, subtus punctata, margine plana integerrima, cum paullis glandulis, costa supra canaliculata, subtus elevata, basi crassa, ca. 3 mm. diam., apice evanida, venis 5–6 paribus, supra profunde vel tenuiter impressis, subtus inconspicuis, petiolis crassis, 5–6 mm. longis. Flores non visi. Fructus subglobosus, 1.7–2.5 cm. longus et 2.2–2.5 cm. diam., 2-loculatus, loculis 5–8-seminatus, seminibus 6–8 mm. longis et 5–7 mm. latis, fructus pericarpio crassissimo 4–6 mm. lato. Pedicelli axillares, solitarii, crassi, 3–4 cm. longi, bracteolis 2 oppositis late ovatis, quam longis latioribus, ca. 3 mm. longis et 5 mm. latis, apice subapiculatis; sepalis 5 imbricatis suborbicularibus, quam longis latioribus, 9–13 mm. longis et 10–15 mm. latis, margine (ut videtur) integerrimis, non glanduloso-denticulatis.

DISTRIBUTION: Peru.

PERU: Dept. Huanuco, Pampayacu, *R. Kanehira* 44 (TYPE, G), Jan. 13, 1927.

Although described from a very poor herbarium specimen, this species is outstanding among all South American species for the large, very thick-walled fruit, from which it derives its name. The pericarp is 5–6 mm. thick and gives the seeds the appearance of being carelessly imbedded in the center of a spongy matrix. Like *T. macrocarpa* Tr. & Pl. and *T. Krukoffiana* Kob., the fruits are borne on strong pedicels. Only a few veins (5 or 6 pairs) are found on the suborbicular leaves. These are deeply and finely impressed on the upper surface but inconspicuous below. Both the sepals and bracteoles are large, wider than long, and the latter are placed close to the sepals.

The species most closely related is *T. macrocarpa* from Colombia. This latter species, although characterized by equally large fruit, can be sep-

arated by the thin walls of the fruit, the larger leaves (9–16 × 5–8 cm.), with veins conspicuously elevated on both surfaces, and the triangular-shaped, keeled bracteoles placed lower on the pedicel.

23. *Ternstroemia macrocarpa* Triana & Planchon in Ann. Sci. Nat. sér. 4, **18**: 259. 1862. — Melchior in Notizbl. Bot. Gart. Mus. Berlin, **13**: 499. 1937. Non Scheffer, 1870.

DISTRIBUTION: Colombia.

COLOMBIA: Forests around Quindio, *Goudot, s.n.* (photo and fragment of TYPE, FM). — Without definite locality, *F. C. Lehmann B.T.862* (NY), *B.T.971* (NY), *B.T.1202* (FM, G). — Dept. El Cauca, Mount El Truena, Cordillera Occidental, shrub-zone ("paramillo"), alt. 2700–3000 m., *F. W. Pennell 7547* (G, NY, US).

Tree. Leaves oblong-obovate, 9–16 cm. long, 5–8 cm. wide, coriaceous rounded or obtuse at apex, obtuse to subcuneate at base, 9–11 pairs of veins conspicuous on both surfaces, granular- or dark-punctate, the margin subcrenulate, plane or slightly revolute, the petiole up to 2 cm. long. Flowers axillary, solitary, the pedicel 2.5–4.5 cm. long, thick, 4–5 mm. diam. at apex; bracteoles 2, subopposite, 5–7 mm. below calyx thick, triangular, keeled, 4 mm. long, the margin scarious, not glandular; calyx-lobes 5, imbricate subligneous, concave, suborbicular, 11–13 mm. long, 11–14 mm. wide (fruiting calyx up to 20 mm. long), the margin scarious, not glandular-denticulate; petals 5, imbricate, suborbicular, 13–15 mm. long, membranaceous; stamens bi-seriate, ca. 60, the filaments thick 1.5 mm. long, joined at the base and adnate to the corolla, the anthers linear, 4–5 mm. long, short apiculate; ovary conical, ca. 4 mm. diam., 2-celled (occasionally 3-celled), few ovules attached at center of ovary near top, the style short, thick (3.5–4.0 mm. long), the stigma evolute 2-parted. Fruit conical, oval, up to 2.5 cm. long, 2 cm. diam., 16–18 seeded. Seeds quite flat, 7–8 mm. long, 5–6 mm. wide.

This species is characterized by large leaves, 9–16 cm. long, 5–8 cm. wide; strong pedicels 2.5–4.5 cm. long, 4–5 mm. thick; large subligneous calyx-lobes 11–13 mm. long (up to 20 mm. long in fruit), 11–14 mm. wide, scarious-margined; large conical fruit up to 2.5 cm. long, 2 cm. wide with 16–18 flat seeds (7 mm. long).

Most closely allied to this species is *T. Krukoffiana*, which has still larger fruit, 4.5–5.5 cm. long and 3.5–4.0 cm. wide, with only one or two huge seeds 3 cm. long and 1.5 cm. wide; calyx-lobes (fruit) not more than 1 cm. long and 0.7 cm. wide; large leaves tapering gradually at the base into a petiole 3 cm. long. Also closely related is *T. pachytrocha*, which can be separated mainly on the very thick pericarp (5–6 mm. thick), the smaller leaves with fewer veins (5–6 pairs) which are deeply imbedded above and inconspicuous below and the broadly ovate bracteoles, wider than long and placed close to the sepals.

24. *Ternstroemia camelliaefolia* Linden & Planchon, Trois Voy. Linden, Bot., Pl. Colomb. **1**: 56. 1863. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. — Sprague in Kew Bull. **1926**: 42. 1926.

Ternstroemia dentata Swartz var. *β. nudiflora* Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 106 (Mém. Ternstr. 18). 1855.

Ternstroemia brevipes Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 103 (Mém. Ternstr. 15). 1855. Pro parte.

Ternstroemia brevipes var. *Blanchetii* Wawra in Martius, Fl. Bras. **12**¹: 275. 1886. — Non Choisy.

Ternstroemia nudiflora (Choisy) Urban in Bot. Jahrb. **21**: 529. 1896. (In observ.)

DISTRIBUTION: Venezuela.

VENEZUELA: State Merida, few miles southeast of Colonia Tovar, alt. 1830 m., *A. Fendler* 50 (G), Apr. 8 & June 22, 1854 and March 14 & May 7, 1855 (tree; fruit opening irregularly; calyx rough, subtended by small bracts). — Colonia Tovar, alt. 2200 m., *A. Jahn* 332 (US), Apr. 1914 (vernacular name "carne asoda"). — Cerro de Turumiquiere, sub-paramo, alt. 1800–2100 m., *G. H. H. Tate* 235 (US).

Tree. Leaves oblong-obovate to broadly obovate, coriaceous, 6–10(–12) cm. long, 3–5 cm. wide, obovate or obtusely acuminate at apex, broadly cuneate at base, green above, reddish tan and dark punctate below, the midrib canaliculate above, raised below, the veins (7–8 pairs) hardly conspicuous above, more evident below, the margin crenulate toward the apex, subrevolute to revolute, the petiole thickened at base 0.8–1.2 cm. long. Flowers axillary, crowded at apex of branchlets, the pedicels short, thick, 4–7 mm. long, 2–3 mm. diam.; bracteoles 2, opposite, subrotund, 3–4 mm. long, a trifle wider, broadly emarginate and cuspidate at apex, almost as large as outer lobes of calyx, the margin scarious, not glandular-denticulate; calyx-lobes 5, imbricate, concave, subrotund, increasing gradually in size from the outer (ca. 5 × 7 mm.) to the inner (8 × 8 mm.), pergamentaceous, concave, the margin scarious, not glandular-denticulate; petals 5, imbricate, joined at base, broadly obovate, 10–11 mm. long, 6–8 mm. wide, scarious-margined; stamens numerous, ca. 5–6 mm. long, anthers and filaments of about equal length, the anthers oblong, not apiculate; ovary abruptly conical, ca. 2.5–3.5 mm. diam., 3-celled, each cell 2-ovulate, sometimes sub-6-celled, the style 3–4 mm. long the stigma tri-crenate, extending well out from the style. Mature fruit (fragmentary) 3 cm. long, the seeds 1 cm. long, probably 6–8 in single fruit; immature fruit (seemingly mature) 1 cm. long.

The outstanding characteristics of this species are (1) the very short, thick pedicels; (2) the scarious margins of the bracteoles and calyx-lobes; (3) the obtuse apex of the anthers; (4) the 3-celled (or 6-celled) ovary and fruit; (5) the tri-crenate stigma; and (6) the large (3 cm. diam.) fruit.

Urban (Fl. Ind. Occ. **3**: 78. 1902), in a bibliographical sketch of Linden, states that only five copies of Linden & Planchon's "Troisième Voyage de J. Linden, Botanique, Plantae Colombianae," in which this species was described, were distributed and that these were allotted to Linden, three other botanists including Urban, and one botanical garden (Brussels). In the same discussion Urban intimates that he considers this distribution of literature to constitute valid publication. Perhaps Urban's comment that only five copies of this work were distributed might be an understatement, since the Arnold Arboretum Library is in possession of a copy procured through Friedländer & Sohn in December, 1911 and Kew also acquired a copy in 1921 from Edouard André. Others may maintain that such a publication does not measure up to Article 35 of the International Code of Botanical Nomenclature (Brussels), since supposedly there was no actual *public* sale or distribution of this work. This becomes merely a matter of personal interpretation. Since a copy of Linden & Planchon's work is at my disposal I would not, under ordinary circumstances, be aware of the

rarity of the publication and would accept the name *T. camelliaefolia* without further thought.

Strangely enough, the only other published name to challenge Linden & Planchon's species is one provided by Urban himself. Urban's combination *T. nudiflora* was made in his observation on West Indian species, and at that time, I am certain, that although he was one of the few to possess Linden & Planchon's publication, he did not realize the existence of *T. camelliaefolia*. He was concerned over *T. brevipes* Choisy, *T. dentata* var. β . *nudiflora* Choisy and *T. brevipes* var. *Blanchetii* Wawra. Hence there is no relationship between his *T. nudiflora* (1896) and his statement (1902) concerning the validity of the work of Linden & Planchon.

However, Urban's *T. nudiflora* (1896) was based on *Funck & Schlim* 173, the same specimen used by Linden & Planchon as the type of *T. camelliaefolia* (1863) and by Choisy as the type of *T. dentata* var. β . *nudiflora* (1855). Later, Melchior (1925), conscious of the two entities, accepted the name *T. camelliaefolia* and reduced *T. nudiflora* to synonymy.

In the copy belonging to the Arnold Arboretum, Linden & Planchon list *T. dentata* var. β . *multiflora* Choisy as a synonym of this species. This was obviously a "lapsus calami," corrected by Sprague (1926) and listed as "*Ternstroemia dentata* β . *nudiflora*" in the republication of Linden & Planchon's new species presented in the Kew Bull. (1926). Sprague, at the same time in an editorial note, stated that *Fendler 50* and *Moritz 1679* were determined by Triana as *T. camelliaefolia*. Since *Fendler 50* has been available for my study, the clue given by Sprague has proved most valuable because Linden & Planchon's description was very incomplete and quite worthless without the type, which I have not seen. However, the dissections from *Fendler 50* and Urban's brief but important supplementary description show that the specimens cited above are true representatives of *T. camelliaefolia*.

25. ***Ternstroemia duidae*** Gleason in Bull. Torrey Bot. Club, **58**: 400. 1931.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Duida, slopes of Ridge 25, alt. 1700–1800 m., *G. H. H. Tate 459* (TYPE, NY), Nov. 26 – Dec. 16, 1928 (shrub 6 ft. high; both calyx and corolla pinkish white).

Small shrub 2 m. high with branchlets slender, verticillate, finely striate. Leaves coriaceous, linear-ob lanceolate, 3–5 cm. long, 0.4–0.6 cm. wide, obtuse at the apex, long-cuneate at the base, the margin entire dotted with a few glands, the midrib impressed above, plane below, the veins not visible, the petiole up to 4 mm. long. Flowers few, solitary, axillary, the pedicels slender, recurved, up to 3 cm. long; bracteoles 2, ovate-lanceolate, 4–7 mm. long, the margin entire, perhaps with only an occasional minute glandular-denticulation; sepals 5, imbricate, broadly ovate, ca. 10 mm. long, 6–7 mm. wide, abruptly acuminate-tipped at the apex, the margin of the outer lobes subscarious, that of the inner more so; petals 5, ovate, 9–10 mm. long, 2.5–3.0 mm. wide, long-acuminate, joined at the base for 6 mm.; stamens 30+, unequal, 5–7 mm. long, the filaments somewhat thick, short, 1–2 mm. long, the anthers linear 3–4 mm. long, the connective projecting into an acumen ca. 1 mm. long; ovary conical, ca. 2 mm. long, 2-celled, few-ovulate,

tapering into stout style 5-6 mm. long, ca. 1 mm. diam. near base, the stigma punctiform.

This excellent species is characterized by: (1) linear-oblong leaves, 3-5 cm. long, 0.4-0.6 cm. wide; (2) pinkish white calyx and corolla of nearly equal length (ca. 10 mm.), both long-acuminate with the latter joined for nearly two-thirds its entirety; (3) the large thick stamens; (4) the two-celled ovary; (5) the stout long (6 mm.) style and (6) the fine punctiform stigma.

25A. ***Ternstroemia duidae*** Gleason forma ***latifolia***, nom. nov.

Ternstroemia paucifolia Gleason in Bull. Torrey Bot. Club, **58**: 401. 1931.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Duida, crest of the Savannah Hills, alt. 1300 m., G. H. H. Tate 859 (TYPE of *T. paucifolia*, NY), Aug. 1928 - Apr. 1929.

Leaves coriaceous, oblong-cuneate, up to 5 cm. long, 0.6-1.5 cm. wide, rounded, occasionally retuse at apex, long-acuminate at base. Fruit globose, ca. 1.3 cm. diam., 2-celled, 6-8-seeded, the seeds ca. 6 mm. long.

This form is merely a wide-leaved variation of the typical *T. duidae*. Also, it is a fruiting specimen, whereas the species is flowering. The stout style (5-6 mm. long) is persistent and very noticeable. I have selected the name forma *latifolia* in preference to the rather meaningless *paucifolia*. The specimen itself, true enough, has only a single leaf attached at present. However, there are fifty or more leaves loose in an attached packet, which is a considerable number for any specimen of *Ternstroemia*.

26. ***Ternstroemia Lehmannii*** (Hieronymus) Urban in Bericht. Deutsch. Bot. Gesell. **14**: 42. 1896. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo Lehmannii Hieronymus in Bot. Jahrb. **20**, Beibl. **49**: 48. 1895.

DISTRIBUTION: Ecuador.

ECUADOR: Prov. Azuay, western slopes of the West Andes of Cuenca, in dense forests near Chagal and Mollenturo, alt. 2000-2800 m., F. G. Lehmann 6674 (ISOTYPES, FM, G, US), Nov. 30, 1893 (tree up to 5 m. high with squarrose and candelabrum-shaped crown of branches; leaves leathery yellow-green, slightly shiny; flowers white).

Small trees up to 5 m. with verticillate, terete, brown or brownish-gray branchlets. Leaves oblong-obovate or rarely elliptic, 8-10 cm. long, 3.5-4.5 cm. wide, coriaceous, obtuse at the apex, contracted into a blunt acumen, rarely subrotund, attenuated at the base into a stout petiole (5-10 mm. long), the margin revolute or subrevolute, subcrenate-serrate, the midrib canaliculate above, prominent below, the veins (8-12 pairs) hardly conspicuous. Flowers axillary, solitary, quite large when open, about 2 cm. across; pedicels sturdy, 1.5-1.7 cm. long; bracteoles 2, opposite, unequal, broadly ovate-triangular or suborbicular, 4-5 mm. long, 3-4 mm. wide, the margin quite entire, with only an occasional glandular-denticulation, subcarinate, mucronate; sepals 5, imbricate, pergamentaceous, suborbicular, unequal, 6-8 mm. long, 7-8 mm. wide, the margin entire, not glandular-denticulate; corolla 8-10 mm. long, the petals joined at base into a campanulate tube 3-4 mm. long, the 5 free petal parts obovate, 7-8 mm. wide, emarginate at the apex; stamens very numerous, over 200, about 5 mm. long, the filaments 3 mm. long, slender, joined at base into a band 2 mm. wide, which in turn is adnate to corolla, the anthers oblong-linear, 2 mm. long, the connective shortly muticous; ovary conical, 2.5 mm. long, 3 mm.

diam. at base, 2-celled, each cell 2–4 ovulate, the style 2.5 mm. long, the stigma bilobed peltate. Fruit not seen.

This is the only species of *Ternstroemia* recorded from Ecuador and the type material cited above is the only material from Ecuador examined in this study. Growing on the western slope of the Andes Mts., it is quite distinct from most other species of the genus.

The outstanding characters are the very large flowers (2 cm. across), the orbicular, eglandular and entire bracteoles and sepals, the very numerous stamens (200+) and the 2-celled ovary. Hieronymus reports the ovary cells to be 2-ovulate. In some of the specimens examined I found as many as four ovules in a single cell.

27. *Ternstroemia meridionalis* Mutis ex Linn. f., Suppl. 264. 1781. — Willdenow, Sp. Pl. **2**(2): 1128. 1799. — H. B. K., Nov. Gen. et Sp. **5**: 160. 1821. — Smith in Rees, Cyclop. **35**: no. 1, 1817. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 102 (Mém. Ternstr. 14). 1855. — Triana & Planchon in Ann. Sci. Nat. sér. 4, **17**: 258. 1862. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. Non Swartz (1788).

Ternstroemia brevipes De Candolle in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 409 (Mém. Ternstr. 17). 1822; Prodr. **1**: 523. 1824. — Pro synonym.

Ternstroemia meridionalis Mutis ex Linn. f. var. *nigricans* Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 103 (Mém. Ternstr. 15). 1855. — Triana & Planchon in Ann. Sci. Nat. sér. 4, **17**: 258. 1862.

Ternstroemia andina Wawra in Martius, Fl. Bras. **12**¹: 278. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Mokofua andina (Wawra) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Mokofua meridionalis (Mutis ex Linn. f.) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo meridionalis (Mutis ex Linn. f.) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

Taonabo andina (Wawra) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

DISTRIBUTION: Colombia.

COLOMBIA: Dept. Cundinamarca: *J. C. Mutis* 1115 (US), 1117 (US), 2453 (ISOTYPE, US), 2475 (US), 3917 (US), 4605 (US). — Vicinity of Bogotá, between El Delirio and Guadalupe, alt. 3000 m., *J. Cuatrecasas* 5139 (US), May 28, 1939 (tree with white flowers). — Near Bogotá, Quebrado de Chicó, alt. 2800 m., *J. Cuatrecasas* 5401 (US), June 8, 1939 (tree with white flowers). — Vicinity of Bogotá, Monserrate, páramo, alt. 3000 m., *J. Cuatrecasas* 7999 (US), Jan. 28, 1940 (tree 3–4 m. with white flowers). — Near Bogotá, *Bro. Ariste-Joseph s.n.* (US) 1921. — Páramos de Bogotá, *M. T. Dawe* 148 (US), March 1916. — Río San Cristobal, near Bogotá, bushy mountain valley, alt. 3000–3300 m., *F. W. Pennell* 2046 (G, NY, US), Sept. 1917 (shrub with white flowers). — Cerro de Focha, near Bogotá, rocky open páramo, alt. 3100–3200 m., *F. W. Pennell* 2208 (G, NY, US), Sept. 1917 (shrub). Dept. Bolivar: Cordillera Occidental, below Páramo de Chaquiro, shrub zone, alt. 3000 m., *F. W. Pennell* 4371 (NY), Feb. 24, 1918 (shrub with white flowers and yellow fruit). Dept. Antioquia: Cerro de la Vieja, alt. 2700 m., *Bro. Daniel* 1692 (US), Dec. 26, 1938. Dept. Santander del Norte: Ocaño, páramos, alt. 3000 m., *L. Schlim* 439 (isotype of *T. andina*, FM), Feb. 1853 (flowers white). Without definite locality, *Purdie s.n.* (G).

Tree or shrub with terete, rugulose branches; branchlets fasciculate (4–6), terete, rugulose, glabrous, grayish. Leaves shortly petiolate (3–5 mm. long), heavy-coriaceous, oblong-obovate, 2–4(–5) cm. long, 1.5–2.0 cm. wide, obtuse at apex, emarginate, subcuneate at base, the margin revolute, usually entire, occasional signs of glandular-serrulation, the midrib canaliculate above, evident the entire length, prominent below, the veins

obscure on both surfaces. Flowers axillary, solitary; peduncles compressed, 5–10 mm. long, occasionally shorter; bracteoles 2, opposite or subopposite, unequal, variable, usually broadly ovate to suborbicular, retuse, semi-beaked at the apex, occasionally triangular, sparsely glandular-denticulate along the margin. Calyx-lobes 5, suborbicular, varying in size, the outer sepals smaller, ca. 5 mm. long and 5 mm. wide, concave, quite thick, the margin scarious, entire, with only an occasional evidence of glandular-denticulation, the inner lobes increasingly larger, up to 8 mm. long and 9 mm. wide. Petals 5–6, white, subcrassulate, ca. 12 mm. long, 10–12 mm. wide, joined for 3 mm. at base, obovate, suborbicular at apex, the margin scarious. Stamens ca. 125, seemingly bi-seriate, unequal, adnate to the base of the corolla; filaments ca. 3 mm. long, joined at base for 2 mm.; anthers oblong-linear, apiculate, ca. 3 mm. long. Ovary hemispherical or subglobose, ca. 3 mm. diam., 2-celled, each cell ca. 5-ovulate, the ovules attached at central axis; style ca. 4 mm. long and 1 mm. diam.; stigma peltate, 2-lobed, the margin crenate. Fruit subrotund-ovate, few-seeded.

Choisy (1855) designated, as distinct, the var. *nigricans* as follows: “feuilles plus évasées en haut, noircissant fortement à la surface supérieure qui est alors rude au toucher.” The specimen collected by *Purdie* (s. n.) in Colombia was cited. A duplicate specimen found in the Gray Herbarium shows the apex of the leaf to be no wider than the apices of most specimens, the upper surface is not especially blackened and does not seem rough to the touch. Later Triana and Planchon (1862), recognized this variety and cited also *Schlim* 439, a duplicate of which also is deposited at the Gray Herbarium. Further descriptive notes concerning the pedicel, “des pédicelles comprimés et à peu près de moitié longueur de la feuille; mais ce caractère doit être variable, puisque dans la variété *nigricans* ils sont très-courts, également à peine la calice, et plutôt obscurément tetragones que comprimés” are added. The pedicel is much too variable to be used as a distinguishing character as a survey of a large number of specimens shows. Usually, the pedicel measures 8–10 mm. However, in *Mutis* 1117 and *Pennell* 4371, the measurement is 4–6 mm., in *Bro. Daniel* 1692, 3–5 mm., in *Schlim* 439, subsessile (apical) — 3 mm. (lateral). In a recent collection, *Cuatrecasas* 5401, the pedicels along the branchlets measure 9 mm. while those at the apex are subsessile. Furthermore, the 4-angled character of a subsessile pedicel which is supposedly compressed in the species is drawing too fine a point. Even the “compressed pedicel” is not a consistent character.

In 1886, Wawra described *T. andina* as new and designated *L. Schlim* 437 as the type. An examination of a photograph of the type clearly shows the number to be 439 and an annotation on the sheet says that the specimen had been cited as no. 437. Wawra's description is rather incomplete and the isotype examined lacked good flowering or fruiting material.

Two specimens, *Killip & Smith* 20626 and 20677 (AA, FM, G, NY, US), collected in Dept. Santander del Norte, have leaves which are much narrower than the specimens cited above. However, since in all other respects they agree with the characters of the species, I do not hesitate in placing them here.

28. **Ternstroemia Jelskii** (Szyszyłowicz) Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo Jelskii Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 189. 1893; in Diss. Cl. Math.-Phys. Acad. Litt. Cracov. **29**: 224. 1894.

DISTRIBUTION: Peru.

PERU: Dept. Piura, Cordillera Guamani, between Huancabamba and Ayavaca, alt. 2900–3000 m., *A. Weberbauer* 6341 (FM, G, US), May 1912 (shrub 2 m. high with white flowers).—Dept. Cajamarca, Cutervo, *C. Jelski* 254 (photo of TYPE, FM, G).—Dept. San Martín, near Tarapoto, *R. Spruce* 4241 (G, NY, photo FM).—Dept. Huánuco, between Huánuco and Pampayacu, alt. 2700–3000 m., *R. Kanehira* 68 (G), Jan. 13, 1927.—Dept. Huánuco, Panao, alt. 2750 m., *J. F. Macbride* 3610 (FM, G, US), May 1923 (small shrub-tree).—Dept. Huánuco, Yanano, rocky places, alt. 1830 m., *J. F. Macbride* 3777 (FM, G, US), May 1923 (shrub-tree; flowers and fruit yellow; anthers red).

According to Szyszyłowicz, this species is characterized by elliptic leaves, 3.5–4.0 cm. long, 1.5–2.0 cm. wide, shining green above, opaque below, the petiole very short. Flowers solitary, pedunculate, axillary; sepals 4–5 mm. long, rounded, broadly ovate, entire; petals orbicular; stamens 2-more-seriate, much shorter than petals, the filaments thick, the anthers oblong, minutely caudate; ovary complanate-globose, 2-celled, the style 1.5–2.0 mm. long; the stigma peltate, subbifid. Fruit ovoid, 1.2–1.4 cm. long; seeds 4, 7 mm. long.

No mention is made of the bracteoles and no measurements are given for the petioles, pedicels, petals and stamens.

All specimens cited above are poor and cannot be diagnosed with surety. They all have in common rounded calyx-lobes (*Weberbauer* 6341 [4–5 mm. long], the others ca. 3 mm. long), very minute bracteoles, short petioles and pedicels. Also, all possess elliptic to obovate leaves, shining above, opaque below, ca. 4 cm. long and 2 cm. wide. The Macbride specimens are fruiting specimens and have 2-celled fruits which are four-seeded. *Weberbauer* 6341 has short (0.5 mm.) sturdy pedicels, whereas all other numbers have pedicels approximately twice as long and more graceful. The type, according to Szyszyłowicz, has stamens, the filaments of which are thick. In the specimens examined, the filaments are long and slender, well exceeding the anthers in length.

29. **Ternstroemia oligostemon** Krug & Urban in Bot. Jahrb. **21**: 534. 1896. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. — R. O. Williams, Fl. Trinidad & Tobago, **1**: 70. 1927.

DISTRIBUTION: Tobago, Trinidad.

TOBAGO: The Widow, *W. E. Broadway* 4154 (FM, Mo, US), Sept. 29, 1910 (shrub with white, sweet-smelling flowers). — Easterfield, *W. E. Broadway* 4369 (FM), Dec. 16, 1912 (bark of trunk rough and dark in color; leaves glossy green). — Slopes of main ridge above Parlatuvier, relict forest bordering cultivations, *N. Y. Sandwith* 1916 (NY), Oct. 24, 1937 (middle-sized tree with white flowers). — Exact locality missing, *F. A. "Durity"* 12620 (NY), Jan. 21, 1932.

This species is characterized by obovate or narrowly obovate-elliptic leaves, 6–10(–14) cm. long and 2.5–5.0 cm. wide, shortly or obtusely acuminate at the apex, long-attenuately tapering at the base into a petiole 8–13 mm. long, the margin subrevolute, crenulate or occasionally entire, frequently glandular, the 10–15 pairs of rather straight veins conspicuous on the lower surface, sometimes obsolete above, the texture is thick-chartaceous

and the surface is free from granular punctations. The flowers are white with a sweet odor and the pedicels measure 1.0–2.5 cm. in length. The sepals are suborbicular, 5–6 mm. long and about 5 mm. wide and like the narrowly ovate bracteoles devoid of glandular-denticulations. The petals are about 7 mm. long. The stamens (ca. 20) are about 5 mm. long, the filaments measuring only 1 mm. in length while the anthers are 4 mm. long, linear and taper gradually to the apex. The ovary is conical, 4-celled, each cell having one or two ovules, and tapering into the style which is crowned by an entire stigma slightly exceeding the style in diameter. The fruit is globose, 12–20 mm. in diameter, 4-celled with one or two seeds in each cell, only one of which usually fully matures.

One of the types of this species, as cited by Krug and Urban, is *Père Duss 171* from Martinique. Before me are several specimens of this collection (supposed isotypes, FM, Mo, NY, US) none of which belongs to this species, but to *T. elliptica*. Perhaps there may be some confusion in the label of the Berlin specimen, since all seven sheets of *Duss 171* in American herbaria are true *T. elliptica*. On the label of two specimens in the New York and U. S. National herbaria are two numbers, 171 and 638. There is no difference in the material but *Duss 638* has been cited by Urban under *T. elliptica*. I doubt very much whether *T. oligostemon* actually grows in either Martinique or Guadeloupe, from which it has been cited. Williams cites material from Trinidad (none of which I have seen), and this, with that from Tobago, perhaps gives the correct geographical distribution for the species.

Krug and Urban's description is very complete. They state, however, that the ovary and fruit are 2-celled or incompletely 4-celled and that the number of ovules and seeds in either case are four. All material sectioned by me showed the ovary and fruit to be clearly 4-celled with one or two ovules in each cell. In the first, eight seeds were found, four of which were fully mature while the other four, although immature, were of considerable size. In other cases, a single seed was found in each cell.

The distinguishing characters of *T. oligostemon* are the four-celled ovary and fruit, the eglandular sepals and bracteoles, the entire stigma and the 10–15 pairs of lateral veins of the thick-chartaceous leaves.

The closest species is *T. delicatula* of Trinidad and French Guiana. This latter species can be distinguished by the 3-celled ovary, the tri-crenate stigma, and the thin papery leaves with 7–8 pairs of lateral veins.

30. ***Ternstroemia retusifolia***, sp. nov.

Rami et ramuli verticillati, grisei, teretes. Folia crasso-coriacea, apice ramulorum verticillata vel basi ramulorum posita, cuneata, 2.5–3.0 cm. longa et 1.0–1.3 cm. lata, apice rotundata, semper retusa, basi attenuata, margine plana, basi rare revoluta, distincte crenulata, subtus punctata, costa supra canaliculata, subtus plana, saepe subimpressa, petiolis 3–5 mm. longis. Flores non visi. Fructus axillares vel apice ramulorum congesti, solitarii, globosi vel subglobosi, ca. 1 cm. longi et 0.9 cm. diam., 2-loculati, loculis 3-seminibus; pedicellis 1.5–2.0 cm. longis; bracteolis 2 vel 4 (raro 3), binis exterioribus inter se oppositis, minimis ovatis 3–4 mm. longis et ca., 5 mm. latis, margine glanduloso-denticulatis, binis interioribus inter

se oppositis, cum exterioribus alternis, longo-ovatis, 6–7 mm. longis et 3.5–4.0 mm. latis, margine distincte glanduloso-denticulatis; sepalis 5, imbricatis longo-ovatis 9–10 mm. longis et 5.0–6.5 mm. latis, apice acuminiatis, margine scariosis integerrimis; petalis (ex corollae fragmento) longo-acuminatis, ca. 6 mm. longis et 2 mm. latis; stylo persistente 5–6 mm. longo; seminibus ca. 5–6 mm. longis.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Auyantepui (Guayana), *F. Cardona* 243 (TYPE, US), Sept. 1937.

Although described from a fruiting specimen, this species presents several outstanding and unusual delimiting characters. The leaves are thick-coriaceous, cuneate, always retuse at the apex, with a distinct crenulate margin, and are punctate on the lower surface. Two pairs of bracteoles are often found on the fruiting pedicel. The outer pair, which is always present, is the smaller. The inner pair, alternating with the outer, is somewhat sepaloid and might be interpreted as extra sepals. Occasionally a single bracteole or sepal, according to one's interpretation, is found instead of the inner pair. The sepals are only sparsely glandular-denticulate.

An annotation on the type sheet intimates that *Cardona* 245, collected at the same locality, is the same as this species. This specimen, which has not been examined in this study, is to be found in "Herb. Venezuela" at Caracas.

31. ***Ternstroemia pungens*** Gleason in Bull. Torrey Bot. Club, **58**: 400. 1931.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Duida: Savanna Hills, dry slopes, alt. 1300 m., *G. H. H. Tate* 837 (TYPE, NY) Aug. 1928 – Apr. 1939 (bush). — Between ridges 23B and 23C, alt. 1850 m., *G. H. H. Tate* 696 (NY, US), Aug. 1928 – Apr. 1939 (large bush; fruit red).

Shrubs with gray, terete, striate branchlets. Leaves coriaceous, obovate to oblong-obovate, up to 5.5 cm. long and 3 cm. wide, rounded and retuse at the apex, cuneate at the base, the margin subentire or finely crenulate especially near the apex, often revolute, upper surface bright green, with impressed midrib and obscure lateral veins, lower surface reddish, profusely black-punctate, the petiole 3–4 mm. long. Fruit borne on long slender recurved pedicels up to 3 cm. long, subglobose, ca. 1 cm. diam., 2-celled, 4–6-seeded, the seeds small, black, ca. 4–5 mm. long, the persistent style 6–7 mm. long, clearly two parted. Fruiting calyx persistent, long-ovate, sharp pointed, involute, 13–15 mm. long, ca. 5 mm. wide at base, the outer lobes glandular-denticulate. The bracteoles appear deciduous or perhaps have been broken off.

The broad obovate leaves, with petioles 3–4 mm. long and profusely black-punctate on the lower surface, are the characters that distinguish this species from *T. tristyla*. On one fruit capsule examined were present a long persistent style, 2-parted as in *T. tristyla*, and fragments of petals showing these two species to be most closely associated.

32. ***Ternstroemia dura*** Gleason in Bull. Torrey Bot. Club, **58**: 401. 1931.

DISTRIBUTION: Venezuela.

VENEZUELA: Mount Duida: Brocchinia Hills, alt. 1350 m., *G. H. H. Tate* 1017 (TYPE, NY), Jan. 4, 1929. — Summit of Peak No. 7, first ridge, alt. 2150 m., *G. H. H. Tate* 656 (NY), Aug. 1928 – April 1929.

Shrub with subverticillate, fissured branchlets. Leaves thick-coriaceous,

elliptic-oblong, up to 3 cm. long, 1.2 cm. wide, obtuse and slightly retuse at apex, tapering at base, the margin revolute, the whole leaf revolute to the midrib and veins invisible, the petiole 1–2 mm. long. Fruit solitary, axillary, the pedicels stout, up to 3 cm. long. Bracteoles 2, opposite, unequal, broadly ovate, 2–3 mm. long, 1.5–2.5 mm. wide, the margin entire with only occasional glandular-denticulations. Calyx-lobes ovate, 8–10 mm. long, 4–5 mm. wide, minutely apiculate, the outer lobes glandular-denticulate along the margin, the inner lobes scarious-margined. Capsule conical-ovoid, ca. 1.5 cm. long, 2-celled, ca. 4-seeded, the seeds light colored, 6–7 mm. long, the persistent style entire, 9 mm. long, the stigma punctiform.

The outstanding characters of this species are the heavy-coriaceous leaves, revolute to the center, the unequal, broadly ovate bracteoles, the minutely apiculate sepals, the 2-celled ovary, the long (9 mm.) style and the punctiform stigma.

33. **Ternstroemia oleaefolia** Wawra in Martius, Fl. Bras. **12**¹: 279. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Mokofua oleaefolia (Wawra) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo oleaefolia (Wawra) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 188. 1893.

DISTRIBUTION: Brazil.

No specimens examined.

Branchlets graceful, subverticillate or dichotomous, grayish, many-leaved. Leaves often 3–5-pseudoverticillate, firm, cuneate-oblong or cuneate-obovate, 3–4 cm. long, 0.5–1.0 cm. wide, obtuse or rounded at apex, very short apiculate, attenuate at base, margin recurved, entire or obsoletely crenulate at apex, concolorous or fuscous and sparsely punctate below, veins obsolete, the petiole 5 mm. long. Flowers few, the pedicels 2 cm. or longer, filiform, subcompressed; bracteoles ovate, 5 mm. long, cuspidate-acuminate; calyx-lobes unequal, ca. 1 cm. long, very acute, margin of outer lobes glandular-denticulate, inner lobes erose; petals connate below, connivent, oblong-lanceolate, somewhat longer than the calyx, the margin crisp; stamens uniseriate, not more than 20, half as long as the petals, the filaments very short, compressed, the anthers subsaggitate, somewhat cuspidate; ovary globose, compressed, 2-celled with indications of spurious septa, 2–3 ovules in each cell, the style filiform, strict, over 1 cm. long, the stigma minute, punctiform, under lens bi-lobed.

Although no material was examined, the species presents characters which separate it from closely allied species. These are (1) the subverticillate branchlets with many small, cuneate, 3–5-pseudoverticillate leaves; (2) the compressed, filiform pedicels; (3) the long (1 cm.) very acute, glandular-denticulate sepals; (4) the stamens uni-seriate, about 20 in number, and (5) the long, filiform style (over 1 cm. long), the minute bi-lobed, punctiform, stigma and the 2-celled ovary.

34. **Ternstroemia dentata** (Aublet) Swartz, Prodr. Veg. Ind. Occ. 81. 1788. — Willdenow, Sp. Pl. **2**³: 1129. 1799. — Smith in Rees, Cyclop. **35**: No. 5. 1817. — De Candolle in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 410 (Mém. Ternstr. 18). 1822; Prodr. **1**: 524. 1824. — Sprengel, Syst. Veg. **2**: 595. 1825. — Spach, Hist. Nat. Veg. **4**: 62. 1835. — Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 106 (Mém. Ternstr. 18). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 278. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo dentata Aublet, Pl. Guian. 1: 569. 1775; 4: t. 227. 1775. — Szyszyłowicz in Nat. Pflanzenfam. III. 6: 188. 1893.

Ternstroemia multiflora Choisy in Mém. Soc. Phys. Hist. Nat. Genève, 14: 106 (Mém. Ternstr. 18) 1855.

Ternstroemia dentata Swartz var. α . *multiflora* Choisy, loc. cit.

Ternstroemia dentata Swartz var. γ . *oblongifolia* Choisy, loc. cit.

Ternstroemia dentata Swartz var. α . *opaca* Wawra in Martius, Fl. Bras. 12¹: 279. 1886.

Ternstroemia dentata Swartz. var. β . *latifolia* Wawra, loc. cit.

Mokofua dentata (Aublet) O. Kuntze, Rev. Gen. Pl. 1: 63. 1891.

DISTRIBUTION: Brazil, French Guiana.

BRAZIL: Prov. Rio Negro, near Barra, *R. Spruce* 1045 (ISOTYPE of *Ternstr. dentata* var. *latifolia*, NY; photo FM, G), Dec. 1850 – Mar. 1851. — Prov. Para, near Santarem, *R. Spruce* 1083 (NY; photo G), Sept. 1850. — Prov. Rio Negro, near Barra, *R. Spruce* 1302 (G, NY; photo FM), May 1851. — Prov. Para, near Santarem, *R. Spruce* s.n. (ISOTYPE of *Ternstr. multiflora*, FM, G), Sept. 1850. — *M. Poeppig* s.n. (ISOTYPE of *Ternstr. dentata* var. *oblongifolia*, fragm. FM), 1834. — Amazonas, Ega, margin of forests, *M. Poeppig* 2667 (ISOTYPE of *Ternstr. dentata* var. *oblongifolia*, FM, and ISOTYPE of *Ternstr. dentata* var. *opaca*, FM). — State of Amazonas, Municipality Humayta, near Livramento on Rio Livramento, on terra firma, *B. A. Krukoff* 6779 (AA, FM, NY, US), Oct.–Nov. 1934 (tree 70 ft. with rose flowers). — State of Amazonas, Municipality Humayta, on plateau between Rio Livramento and Rio Ipixuma, on campinarana alta, *B. A. Krukoff* 7087, 7287 (AA, FM, NY, US), Nov. 1934 (tree 65 ft.). — State of Amazonas, Municipality Manaus, along road to Aleixo, high forest, terra firma, *B. A. Krukoff* 8036 (AA, FM, NY), Aug.–Sept. 1936 (low tree or shrub). FRENCH GUIANA: Without definite locality, *Leprieur*, s.n. (fragm. FM).

Trees or shrubs. Leaves coriaceous, obovate to elliptic-obovate, 6–13 cm. long, 2–6(–7) cm. wide, obtusely acuminate at apex, cuneate at base, the margin serrate, 8–12 pairs of veins generally evident on both surfaces, sparsely dark-punctate on the undersurface, the petiole 0.7–1.0 cm. long (2 cm. in *Spruce* 1045). Flowers axillary, usually solitary, occasionally 2-fasciculate. Pedicel 1.5–2.5 cm. long, subterete. Bracteoles 2, unequal, long-triangular, ca. 2 mm. long, sparsely glandular-denticulate. Calyx-lobes 5, imbricate, pergamentaceous, 7–8 mm. long, unequal, the outer lobe ca. 5 mm. wide, ovate, glandular-denticulate, the inner lobe ca. 6.5 cm. wide, obovate, the margin scarious. Petals 5, imbricate, pink or rose, oblong-ovate, ca. 8 mm. long, 4 mm. wide, membranaceous, the margin scarious. Stamens bi-seriate, ca. 35, joined their entire length; filaments ca. 1.5 mm. long; anthers long-tapering, unequal, apiculate, 4.0–4.5 mm. long. Ovary conical, two- or four-celled (occasionally incompletely four-celled), four-ovulate, tapering through style (2.5–3.0 mm. long) into a punctiform stigma. Fruit subglobose, ca. 1 cm. diam., two- or four-celled, four-seeded, each seed ca. 7 mm. long.

The most distinctive features of this species are the dentate leaves, the two- or four-celled ovary and fruit, and the long apiculate stamens with apicules nearly 2 mm. long.

Choisy (1855) recognized three varieties, namely var. *multiflora*, var. *oblongifolia* and var. *nudiflora*. Wawra (1886) suggested two new varieties, namely var. *latifolia* and var. *opaca*. Of these, var. *nudiflora* was raised by Urban to specific rank. Varieties *multiflora*, *oblongifolia* and *opaca* present no differences to warrant consideration.

Wawra's var. *latifolia* is indeed a wide-leafed specimen and when he prepared his treatment *Spruce* 1045 probably was worthy of distinction. How-

ever, with more ample material available, the larger leaves of *Spruce* 1045 (7 cm. wide) are less than a single centimeter wider than the larger leaves of *Krukoff* 7287, which, in turn, has also the smaller leaves typical of the species.

35. ***Ternstroemia brachypoda*** (Wawra), comb. nov.

Ternstroemia Pavoniana? Moricand var. *brachypoda* Wawra in Martius, Fl. Bras. **12**¹: 278. 1886.

DISTRIBUTION: Peru.

PERU: Tatamara, *Lechler* 2613 (photo and fragment of TYPE, FM, G).

Branchlets verticillate, angled or striate. Leaves membranaceous or chartaceous, oblong-obovate, 2.5–3.0 cm. long and 1.0–1.5 cm. wide, obtuse and retuse at apex, attenuate at base, the margin denticulate, plane or slightly revolute, the midrib impressed above, elevated below, the veins obscure above, 4–5 pairs elevated below, reticulate, the petiole 3–5 mm. long. Flowers small, solitary with short pedicels; bracteoles ovate, glandular-denticulate; sepals 5, orbicular, glandular-denticulate, hardly exceeding the obovate petals; stamens very small, clavate, the anthers obovoid, muticous, attenuated into slender filaments; ovary 2-celled, each cell 2-seeded; style thick short, the stigma punctiform.

This species was described originally by Wawra as a dubious variety of *T. Pavoniana* Moricand (= *T. quinquepartita* R. & P.). Although only leaf-fragments and a photograph of the type are available for the study of this species, it is clear that it deserves specific status and that the relationship with *T. quinquepartita* is quite superficial. Both have small leaves and flowers. However, in *T. brachypoda* the leaves are more obovate and membranaceous, with veins raised and reticulate on the lower surface, not evident on the upper surface. In *T. quinquepartita* the leaves are more suborbicular and heavy-coriaceous, with the veins deeply etched on the upper surface and raised on the lower surface. The pedicels in *T. quinquepartita* are 2.0–2.5 cm. long, whereas in *T. brachypoda* they are described by Wawra as “brevissime pedunculatis.” Detailed descriptive characters and measurements, for the most part, were overlooked by Wawra.

36. ***Ternstroemia laevigata*** Wawra in Martius, Fl. Bras. **12**¹: 281. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Mokofua laevigata (Wawra) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Roraima, *R. Schomburgk* 573 (ISOTYPE, FM).

Branches terete, smooth, gray. Leaves coriaceous, oblong-obovate, 5–8 cm. long, 2–3 cm. wide, pale green above, reddish below, veins hardly visible above, both surfaces smooth and free from any punctations, the margin subrevolute, denticulate, the petiole ca. 1 cm. long. Flowers few, the peduncles 1.5–3.0 cm. long; bracteoles acuminate, glandular-denticulate; calyx-lobes subequal, rounded, ca. 5–6 mm. long; glandular-denticulate; petals connate below, shorter than the calyx-lobes, oblong connivent and crisp at the apex; stamens included, 2-seriate, adnate to base of corolla, equalling corolla in length, the filaments very wide, the anthers linear; ovary globose, striate, bi-locular, cells 2-seeded or if 4-celled, one-seeded; style filiform equalling the calyx in length; stigma very minute, punctiform, bisulcate.

Only a leaf-specimen was available for study. The statistics concerning the flower were taken from Wawra's description. Szyszyłowicz treated this species as a synonym of *T. Schomburgkiana*, evidently not taking into consideration the differences in ovary characters and leaf shape and texture.

37. *Ternstroemia polyandra*, sp. nov.

Arbor parva, ca. 3 m. alta, ramulis griseis teretibus. Folia coriacea, oblongo-obovata vel oblongo-elliptica, 7–12 cm. longa et 3–4 cm. lata, apice obtusa rare rotundata, basi cuneata, subtus brunneo-punctata, margine subrevoluta, denticulata, costa supra canaliculata, subtus elevata, venis (8–10 paribus) secundariisque undique elevatis reticulatisque, petiolis ca. 1 cm. vel plus longis. Flores axillares, solitarii, apice ramulorum congesti, pedicellis teretibus circiter 1.5 cm. longis, bracteolis 2 oppositis late ovato-triangularibus crassis circa 3 mm. longis et 2.5–3.0 mm. latis, margine glanduloso-denticulatis, apice subapiculatis; sepala 5, imbricata, orbicularia vel suborbicularia, 6–7 mm. longa et 6.0–7.5 mm. lata, exterioribus margine glanduloso-denticulatis, interioribus margine scariosis integerrimis; petala 5, suborbicularia, circiter 6–7 mm. longa et 7–8 mm. lata, emarginata, basi 2 mm. connata; stamina plurima, circiter 300, 4-seriata (ut videtur), 2–4 mm. longa (eodem flore), filamentis gracilibus 1.0–2.5 mm. longis (eodem flore), antheris linearibus 1.0–1.5 mm. longis, connectivo plano, non mutico; ovarium late conicum, circiter 2 mm. longum et 2 mm. diametro, 2-loculatum, loculis 3-ovulatis, stylo parvo 2 mm. longo, stigmate punctiformi bi-lobato. Fructus semi-globosus, circiter 1.2 cm. longus et 1 cm. diametro, 2-loculatus, seminibus 4, circiter 5 mm. longis.

DISTRIBUTION: Bolivia.

BOLIVIA: Santa Barbara, alt. 1500 m., *R. S. Williams 1565* (TYPE, NY), Aug. 30, 1902 (8 ft. high, 2 in. diam.). — Same locality, *R. S. Williams 1565A* (NY). — Hacienda Simaco, on the road to Tipuani, alt. 1400 m., *O. Buchtien 5468* (NY, US), Feb. 1920.

As the name signifies, this species is characterized by many stamens, 300 or more, 4-seriate. Also, the oblong-obovate leaves, dark-punctate below and conspicuously veined in both surfaces, are conspicuous characters. *Buchtien 5468* does not show this veining as conspicuously as the type.

Cited here also might be *Bang 2360*. This fruiting specimen agrees in most characters with the type. However, the leaves have a very smooth texture, unusual in the specimens studied, and lack the dark-punctate dots on the lower surface.

38. *Ternstroemia verticillata* Klotzsch ex Wawra in Martius, Fl. Bras. **12**¹: 272.

1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Ternstroemia verticillata Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092.

1848. — Nomen nudum.

Mokofua verticillata (Klotzsch) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo verticillata (Klotzsch) Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 188. 1893.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Along banks of Courantyn River, *R. Schomburgk 1566* (TYPE; photo. G, FM), July-Oct. 1843. — Kaieteur Savannah, in thickets on rocky ground, alt. 360 m., *N. Y. Sandwith 1295* (NY), Sept. 2, 1937 (small tree; flowers sweet-scented, petals yellow, sepals white with deep red center).

Branchlets 5–6-verticillate. Leaves coriaceous, obovate to cuneate-oblong, 2–4 cm. long, 1–2 cm. wide, often 3–5-verticillate, truncate to retuse at apex, pale green, opaque above, fuscous, granular-punctate below, veins

inconspicuous, the margin glandular-crenulate near apex, subsessile or with petiole up to 5 mm. long. Flowers axillary, solitary, the pedicel ca. 1 cm. long, graceful; bracteoles 2, ovate-oblong, 2–3 mm. long, glandular-denticulate; calyx-lobes 5, ovate, submembranaceous, not pergamentaceous, 5–6 mm. long, the margin subscarious yet glandular-denticulate; corolla 7 mm. long, the 5 petals coalesced 5 mm., free portions 2 mm. long, ovate-lanceolate; stamens few, ca. 25, uni-seriate, 4–5 mm. long, the filaments 1–2 mm. long, some filiform, others thick, the anthers linear, acuminate, 2.5–3.0 mm. long; ovary conical, 1.5 mm. diam. at base, tapering into style 4 mm. long, 2-celled, each cell 2-ovulate, sometimes incompletely 4-celled, then each cell 1-ovulate, the stigma punctiform, bi-lobed.

The outstanding characters of this species are: (1) branchlets and sometimes leaves verticillate; (2) leaves truncate or retuse at apex; (3) submembranaceous, colored calyx-lobes which are glandular-denticulate; (4) the corolla coalesced for over two-thirds its entire length; (5) the uni-seriate (25) stamens.

The coalesced corolla separates the species from all others studied. Nearest is *T. globiflora* which is more nearly gamopetalous, having only minute lobes at apex. In *T. verticillata*, the corolla is globose at the base, tapering toward apex where the petals become free.

39. ***Ternstroemia Klugiana*, sp. nov.**

Arbor 8–15 metralis, ramulis teretis verticillatis. Folia coriacea, oblongo-obovata, 6–8 cm. longa, 2.5–3.5 cm. lata, apice obovata, subite acuminata, basi longe attenuata, supra nitida, subtus opaca, costa supra canaliculata apice evanida, subtus prominente elevata, venis 15 vel plus paribus supra haud manifestis, subtus obscuris, margine integerrima, plana vel sub-revoluta, petiolis ca. 1 cm. longis. Flores solitarii, pedicellis circiter 9 mm. longis, bracteolis 2 oppositis ovatis circiter 2 mm. longis et 1.0–1.5 mm. latis acuminatis subcarinatis, margine paucissime (1–3) glanduloso-denticulatis; sepala 5, imbricata, 3.5–4.0 mm. longa, exterioribus ovatis circiter 2 mm. latis, apice subacutis, margine paucissime (1–3) glanduloso-denticulatis in sicco revolutis, interioribus late ellipticis vel obovatis, 2.5–3.0 mm. longis, apice obtusis, margine scariosis, non glanduloso-denticulatis; petala 5, membranacea, obtusa, circiter 5.5 mm. longa, 2–3 mm. lata, basi 3 mm. connata; stamina circiter 25, uni-seriata, 3–4 mm. longa, apiculata, filamentis compressis, circiter 0.5 mm. longis, connatis, ad basim corollae adnatis, antheris oblongo-linearibus, circiter 2 mm. longis, apiculis 1 mm. vel plus longis; ovarium conicum, basi 1 mm. vel plus diam., 2-loculatum, loculis uno-ovulatis, stylo 2.5–3.0 mm. longo, stigmate punctiformi. Fructus conicus, aureus (fide coll.), circiter 7 mm. longus, basi 6 mm. diam., apice 1 mm. diam. Semina non visa.

DISTRIBUTION: Peru.

PERU: Dept. Loreto, Mishuyacu, in forest near Iquitos, alt. 100 m., *G. Klug* 64 (TYPE, NY), Oct.–Nov. 1929 (tree 8 m. high; flowers white). — Same locality, *G. Klug* 1561 (NY), May–June 1930 (tree 15 m. high; fruit orange).

The outstanding and distinguishing characters of this species are (1) the obovate, coriaceous, abruptly acuminate leaves with 15 or more pairs of obscure, rather straight veins; (2) the short (9 mm.) erect pedicels; (3) the revolute acute outer calyx-lobes (3.5–4.0 mm. long), very sparingly

glandular-denticulate; (4) the petals connate for two-thirds their length; (5) the uni-seriate stamens with apicules longer (1 mm.) than the compressed filaments; (6) the 2-celled ovary and small, punctiform stigma; (7) the distinctly conical fruit.

40. *Ternstroemia carnosa* Cambessèdes in A. St. Hilaire, Fl. Bras. Mer. **1**: 299. 1827. — Walpers, Repert. Bot. Syst. **1**: 369. 1842. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 102 (Mém. Ternstr. 14). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 276. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Ternstroemia carnosa Cambessèdes var. *acutifolia* Wawra in Martius, Fl. Bras. **12**¹: 276. 1886.

Mokofua carnosa (Cambessèdes) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo carnosa (Cambessèdes) Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 188. 1893.

DISTRIBUTION: Brazil.

BRAZIL: State of Minas Geraës, near Palmita, A. St. Hilaire s.n. (TYPE; photo and fragment, FM). — State of São Paulo, in swamps, Martius s.n. (TYPE of *T. carnosa* var. *acutifolia*; photo, FM, G). — State of Goyaz, Santa Luzia, Serra do Cipó, stony field, M. Barreto 4509 (FM), Aug. 17, 1936 (tree 2 m., rare).

According to Wawra, the principal characters of this species are: Leaves coriaceous, 3–6 cm. long, oblong, rounded at apex, rarely shortly acuminate, the margin revolute, entire or obsoletely crenulate, the petiole short, ca. 3 mm. long. Peduncles 1.0–1.5 cm. long, terete, the bracteoles coriaceous, ovate, 4 mm. long, suborbicular, the margin sometimes glandular-denticulate. Sepals 7–10 mm. long, subequal, obovate or suborbicular, the outer lobes glandular-denticulate, the inner lobes entire. Petals exceeding the calyx in length, ovate, joined at the base. Stamens bi-seriate, shorter than the petals, the filaments compressed, very short, the anthers linear, long-mucronate. Ovary globose, 2- or 4-celled, the cells 3–4-ovulate, the style thick, equalling the stamens in length, the stigma punctiform, sub-bi-lobed.

Complete material of this species and *T. cuneifolia* have not been available for this study. I am very dubious of the status of the latter as a species. Wawra, in Martius, Fl. Bras., says that the stigma is punctiform, that the petals exceed the calyx-lobes (7–10 mm. long) in length and that the anthers are long-mucronate.

41. *Ternstroemia asymmetrica* Rusby in Bull. N. Y. Bot. Gard. **4**: 327. 1907.

Mokofua Lorentzii Hieronymus ex O. Kuntze, Rev. Gen. Pl. **3**²: 17. 1898. Nomen nudum.

Taonabo flavifolia Rusby in Bull. N. Y. Bot. Gard. **8**: 104. 1912. Syn. Nov.

DISTRIBUTION: Bolivia.

BOLIVIA: A. M. Bang 1974 (TYPE, NY). — Songa, A. M. Bang 837, 838 (FM, G, Mo, NY, US), Nov. 1890. — Atten, alt. 1500 m., R. S. Williams 1452 (TYPE of *T. flavifolia*, NY), Aug. 17, 1902 (tree 20 ft. high, 6 in. diam.). — Huaynachorisa, alt. 1100 m., R. S. Williams 1538 (NY, US), July 26, 1902 (tree 25 ft. high). — Buyuyu, P. Lorentz & G. Hieronymus 869 (FM, NY, photo G). — Dept. La Paz, Prov. Larecaja, Copacabana (about 10 km. s. of Mapiri), alt. 850–950 m., B. A. Krukoff 11011, 11212 (AA, NY), Oct.–Nov. 1939 (tree 60 ft.)

Tree up to 60 ft. with grayish branches. Leaves coriaceous, oblanceolate to obovate, 3–9 cm. long, 2–3 cm. wide, sometimes inequilateral, slightly blunted or acuminate at the apex, tapering at the base into a petiole, the midrib canaliculate above, prominent below, the veins (10–12 pairs) somewhat prominent above, inconspicuous below, the margin entire or nearly so, the petiole ca. 1 cm. long. Flowers solitary, the pedicels ca. 1 cm. long;

bracteoles 2, opposite, very minute, ovate-triangular, ca. 1 mm. long, apiculate, glandular-denticulate; calyx-lobes orbicular or suborbicular, unequal, concave, pergamentaceous, 4–5 mm. long and 4–5 mm. wide, the outer lobes glandular-denticulate; petals obovate, 7–8 mm. long, 6–7 mm. wide, emarginate at the apex; stamens ca. 40, 5 mm. long, the filaments slender 3 mm. long, joined at base and adnate to base of corolla, the anthers linear, ca. 2 mm. long, the connective hardly muticous; ovary ovate-conical, ca. 2 mm. long and 2 mm. diam. at base, 2-celled, each cell 2–3-ovulate, the style 2.5 mm. long, the stigma punctiform, bi-lobed. Fruit globose, ca. 8–9 mm. diam.; seeds 2 or more, ca. 5–6 mm. long.

In the original description of this species, Rusby concentrates on branchlets and leaves, devoting little consideration to flowers, especially floral measurements and ovary characters, thus handicapping workers who have lacked access to the types. The species is based, so it seems, on the asymmetrical leaves. This character, even in the type, is not very prominent; in fact, some of the specimens cited above hardly exhibit such leaves. Later, Rusby described *T. flavifolia*. I can see no true characters separating this second species from *T. asymmetrica*. It is merely a fruiting specimen of the original species.

The outstanding characters of *T. asymmetrica* are the very small floral and fruiting parts. The calyx-lobes measure not more than 5 mm. in length and the bracteoles are correspondingly small, measuring only a single mm. Both are glandular-denticulate. The ovary is 2-celled and the fruit small, globose and few-seeded.

Other specimens, with slight variations, which perhaps should be cited here are *B. A. Krukoff* 11006 and 11288 collected at Copacabana (about 10 km. south of Mapiri). These two specimens have wider leaves and slightly larger flowers. Number 11288 has been identified with *T. congestiflora*. In fact, many specimens of *Ternstroemia* in Bolivia have been identified with *T. congestiflora* from Colombia. The Colombian species is very distinct, having much heavier coriaceous leaves, obtuse at both extremities, with veins conspicuous on the under surface. Another specimen, *Steinbach* 6057, probably belongs here. This last specimen has smaller leaves which are quite regularly elliptic.

42. ***Ternstroemia clusiaefolia*** Humboldt, Bonpland & Kunth, Nov. Gen. Sp. 5: 161, t. 463, fig. 1, 1821. — Sprengel, Syst. Veg. 2: 595, 1825. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, 14: 103 Mém. Ternstr. 15), 1855. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 142, 1925.

Mokofua clusiaefolia (H. B. K.) O. Kuntze, Rev. Gen. Pl. 1: 63, 1891.

Taonabo clusiaefolia (H. B. K.) Szyszylowicz in Nat. Pflanzenfam. III. 6: 189, 1893.

DISTRIBUTION: Colombia.

COLOMBIA: Dept. Cauca, Popayan, between Hacienda de Meneses and Pasto, alt. ca. 2400 m., *A. Bonpland* 2152 (photo of TYPE, FM). — Dept. Santander, forest on mountains east of Las Vegas, alt. 3000–3300 m., *E. P. Killip & A. C. Smith* 15866 (AA, G, NY, US), Dec. 1926 (tree). — Dept. Santander, forests in vicinity of Charta, alt. 2000–2600 m., *E. P. Killip & A. C. Smith* 18902 (AA, FM, G, NY, US), Feb. 1927 (tree 10–12 ft.; fruit green, lustrous).

Tree 25–35 ft. Branchlets subverticillate. Leaves oblong-obovate, 6–8 cm. long, 3.0–3.5 cm. wide, coriaceous, obtuse at apex, tapering at base,

midrib canaliculate above, prominent below, venation invisible, dark-punctate below, the margin entire, plane, the petiole 0.7–1.0 cm. long. Flowers (*Killip & Smith 15866*) described below. Fruit ovate-subglobose, ca. 10 mm. long and 7 mm. wide, 2-celled, the pedicel ca. 2 cm. long, the calyx-lobes suborbicular, the outer lobes 7 mm. long, 5 mm. wide, the inner lobes 1 cm. long, 7 mm. wide.

Flowers (*Killip & Smith*) axillary, solitary, the pedicels 1.2–1.5 cm. long; bracteoles minute ca. 2 mm. long, somewhat glandular; calyx-lobes suborbicular, 5–6 cm. long, outer lobes fimbriate, occasionally glandular, inner lobes scarious-margined; petals 5, free nearly to base, obovate, ca. 5.5 mm. long and 3.5 mm. wide; stamens bi- or tri-seriate, nearly 100, 3–4 mm. long, the filaments filiform, ca. 1.5 mm. long, joined at the base, the anthers oblong-linear, ca. 2.5 mm. long, subapiculate; ovary minute, 2-celled, few-ovulate, the style 2⁺ mm. long, longer than the ovary, the stigma punctiform, bi-lobed, swelling slightly.

The type of this species, of which only a photograph has been available for this study, is a fruiting specimen. Dr. A. C. Smith compared *Killip & Smith 15866*, a flowering specimen, with the type in Paris and reported that the two matched perfectly. The above description of the flower was drawn from this number.

The margin of the fruiting calyx-lobes in the type is described as membranaceous. In *Killip & Smith 15866*, the calyx-lobes (flowering) are somewhat smaller and the margin is quite membranaceous but also fimbriate with an occasional evidence of glandular-denticulations. The leaves of the two specimens match very well.

43. ***Ternstroemia longipes*** Klotzsch ex Wawra in Martius, Fl. Bras. **12**¹: 277. 1886.

— Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Ternstroemia longipes Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848.

— Nomen nudum.

Mokofua longipes (Klotzsch) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo longipes (Klotzsch) Szyszylowicz in Nat. Pflanzenfam. III, **6**: 189. 1893.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: *R. Schomburgk 1103* (TYPE; photo, FM, G), Dec. 1842.

Originally published by Klotzsch as a nomen nudum, this species was later described by Wawra in Martius, Fl. Bras. Only a photograph of the type was available for study. Except for a few measurements and general observations most of the following data were obtained from Wawra's description. Incidentally, the photo of the type shows only one mature leaf and one flower.

The leaves are described by Wawra as submembranaceous, elliptic, 4–6 cm. long, 1–2 cm. wide, acute at both extremes, the margin undulate, somewhat glandular-crenulate, the veins obscure, the petiole ca. 1 cm. long. The flowers, according to Wawra, are few, solitary, internodal [most unusual, if true]; pedicel slender, ca. 4 cm. long; bracteoles [2] ovate or oblong, 2 mm. long, glandular-denticulate, glandular-apiculate; sepals [5] subequal, 5 mm. long, orbicular, the outer lobes glandular-denticulate; petals broadly obovate, equalling the calyx in length, subentire; stamens bi-seriate, shorter than petals, the filaments (in same flower, unequal) filiform or very short and thick, the anthers linear, subsagittate, laterally dehiscent, subulate, apiculate; ovary ovoid-globose, two-celled, cells bi-

ovulate, the style terete, thick, shorter than the ovary, the stigma deeply bisulcate or divided into two substipitate, orbicular stigmas.

The outstanding characteristics seem to be the elliptic submembranaceous leaves, the internodal flowers, the long pedicel, the laterally dehiscent anthers and the very short style.

44. ***Ternstroemia crassifolia*** Benth in Hooker, London Jour. Bot. **2**: 363. 1843. — Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 106 (Mém. Ternstr. 18). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 276. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Ternstroemia suborbicularis Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. — Nomen nudum.

Ternstroemia crassifolia Benth var *suborbicularis* (Klotzsch) Wawra in Martius, Fl. Bras. **12**¹: 277. 1886.

Mokofua crassifolia (Benth) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo crassifolia (Benth) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

DISTRIBUTION: British Guiana.

BRITISH GUIANA: Roraima, *R. Schomburgk* 602 (probable ISOTYPE, FM).

Leaves obovate, coriaceous, obtuse to rounded at the apex, cuneate at the base, 4–6 cm. long, 1.5–3.0 cm. wide, the margin subrevolute, lightly denticulate at the apex, the veins, except for midrib, obscure, the petiole 0.8–1.0 cm. long. Flowers axillary, solitary, or few-fasciculate at end of branchlets; pedicel ca. 6 mm. long; bracteoles 2, suborbicular, ca. 1.5 mm. long; calyx-lobes 5, imbricate, suborbicular, small, 2.5–3.5 mm. long, ca. 2.5 mm. wide, outer lobes glandular-denticulate; petals 5, imbricate, joined at base, 4–5 mm. long, rounded at apex; stamens seemingly bi-seriate, ca. 4 mm. long, the filaments and anthers both very narrowly linear and both ca. 2 mm. long, the anthers acuminate at apex; ovary (fide Wawra) 2-celled, each cell 2- or 1-ovulate, the style shorter than the ovary, the stigma discoid, bi-lobed.

The leaves of this species are not as thick as the name would indicate, when all other species are taken into consideration. The closest relative seems to be *T. discoidea* Gleason, which has a 3-celled ovary and a tri-crenate stigma. Otherwise, they agree very well. Only a leaf-specimen and fragmentary flowers of the specimen cited above were available for study. The observation that the ovary is 2-celled and the stigma discoid and bi-lobate is based on Wawra's description. Benth, in the original description, failed to mention the ovary, style, stigma or fruit, the description, in fact, being rather general.

45. ***Ternstroemia quinquepartita*** Ruiz & Pavon, Syst. Veg. Flor. Peruv. Chil. 180. 1798. — De Candolle in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 411 (Mém. Ternstr. 19). 1822; Prodr. **1**: 524. 1824.

Ternstroemia Pavoniana Moricand in Mém. Soc. Phys. Hist. Nat. Genève, **7**: 258 (Pl. Nouv. D'Amer. 18), t. 13. 1836. — Walpers, Repert. Bot. Syst. **1**: 369. 1842. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 102 (Mém. Ternstr. 14). 1855. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo Pavoniana (Moricand) Szyszylowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

Ternstroemia pentapetala Pavon, in herb. — Moricand (1836) and Choisy (1855) in Synon. — Non Jack, 1820.

DISTRIBUTION: Peru.

PERU: In Andium sylvaticis et frigidis versus Pallao vicum, *J. Pavon s.n.* (TYPE, Madrid; ISOTYPE & photo, FM).—Locality not given, probably same as above, *J. Pavon s.n.* (TYPE of *T. Pavoniana*, Genève; photo & fragment, FM).

Leaves heavy-coriaceous, oblong-obovate, ca. 2.5 cm. long, 1.0–1.2 cm. wide, rounded, emarginate at apex, cuneate at base, 3–4 pairs of veins deeply etched on the upper surface, obscure below, the cross-veins equally impressed above, the margin revolute, obscurely serrulate, the petiole up to 3 mm. long. Flowers axillary, solitary. Pedicels 2.0–2.5 cm. long, the bracteoles 2, opposite, ovate-lanceolate, ca. 3 mm. long, carinate, the margin glandular-denticulate. Calyx-lobes 5, imbricate, suborbicular, 5–6 mm. long, ca. 4 mm. wide, pergamentaceous, concave, the outer lobes glandular-denticulate. Petals 5, imbricate, joined lightly at the base, obovate, ca. 5–6 mm. long, ca. 5 mm. wide. Stamens (fide Moricand) ca. 100, in several series, ca. 3 mm. long, attached to the base of the petals, the filaments slender, 2 mm. long, joined firmly together at the base, the anthers oblong, shortly mucronate, 1 mm. long. Ovary minute, subconical, ca. 1 mm. long, 2-celled, 3–4 ovules in each cell, attached at apex, the style thick, ca. 1.5 mm. long, the stigma peltate. Fruit subglobose-subconical, ca. 1 cm. long, 2-celled, 2-seeded, the seeds ca. 5–6 mm. long.

Outstanding characters are the small, deeply etched heavy-coriaceous leaves, rounded and emarginate at the apex. For a species with leaves so small, the pedicels (2.5 cm.) are unusually long. Fortunately, I have before me the fragmentary isotype and photograph of Pavon's actual type of this species. The original description is useless.

According to Moricand, Pavon sent him a specimen of *T. quinquepartita*, to which the herbarium name "*Ternstroemia pentapetala*" was applied. Moricand described a new species, *T. Pavoniana*, based on this specimen. In his discussion, Moricand remarks that *T. Pavoniana* might be the same as Pavon's *T. quinquepartita* but that it is impossible to be certain from the simple description of Pavon. Furthermore, the name *T. pentapetala* appended to the specimen means exactly the opposite of *T. quinquepartita*, which, Moricand goes on to say, is a false epithet. He states further that the stamens, though a little more bunched in front of the middle of the petals seem to him to be arranged in continuous series rather than in five distinct phalanges as stated by Pavon.

Just when the specimen was sent by Pavon to Moricand is difficult to determine since 38 years elapsed between the publication of the two species. However, in 1898, Moricand was merely 19 years of age, so one might assume that it was sent surely after the publication of *T. quinquepartita*. It is further possible that Pavon, who died (1835) a year before Moricand's publication may have forgotten the existence of his *T. quinquepartita* and felt that in *T. pentapetala* he had a new species. This latter name, incidentally, was at that time invalidated because there already existed a *T. pentapetala* from Malaya described by Jack in Malay. Misc. 1: pt. 5, 40. 1820.

At any rate, since these names are synonymous, the original binomial, *T. quinquepartita*, must be retained. Choisy (1855) follows the lead of Moricand and accepts Moricand's name, understanding the whole situation;

he did not like Pavon's name! Neither did Szyszyłowicz (1893) and Melchior (1925) evidently, since both have continued the name *T. Pavoniana*, the former under *Taonabo* and the latter under *Ternstroemia*.

46. ***Ternstroemia cuneifolia*** Gardner in Hooker, London Jour. Bot. **4**: 100. 1845.
— Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 102 (Mém. Ternstr. 14). 1855. Wawra in Martius, Fl. Bras. **12**¹: 276. 1886. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142, fig. 64. 1925.

Ternstroemia cuneifolia var. *glutinosa* Wawra in Martius, Fl. Bras. **12**¹: 276. 1886.

Mokofua cuneifolia (Gardner) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo cuneifolia (Gardner) Szyszyłowicz in Nat. Pflanzenfam. III. **6**: 189. 1893.

DISTRIBUTION: Brazil.

BRAZIL: Near Rio de Janeiro, Organ Mts., open places, alt. 1800 m., *G. Gardner* 5681 (ISOTYPE, NY; fragment, FM) (shrub 2-3 ft.; petals white). — Near Rio de Janeiro, *A. Glaziou* 8277 (photo of type of *T. cuneifolia* var. *glutinosa*, FM, G). — Precise locality lacking, *A. Glaziou* 14525 (G).

According to Wawra, the principal characters of this species are: Leaves coriaceous, cuneate-oblong, 3-6 cm. long, rounded or retuse at the apex, the margin obsoletely revolute, distinctly serrulate at apex, the petiole 0.5 cm. long. Peduncles 1.0-1.5 cm. long, the bracteoles ovate, 2 mm. long, rounded at apex. Sepals 4-6 mm. long, orbicular, the outer lobes 4 mm. long, glandular-denticulate, the inner lobes 6 mm. long, entire. Petals orbicular, shorter than calyx-lobes, connivent. Stamens 25, bi-seriate, the filaments flattened, the anthers linear-sub sagittate, five times longer than the filaments, very short-apiculate. Ovary 2-3-celled, cells 2-ovulate, the style very short, the stigma peltate, 2-3-lobed.

This species is so closely allied to *T. carnosa* that I am dubious of the specimens cited above and dubious even of its status as a species. Considerable variation may be found in the leaf and flower characters. The peltate stigma, the petals shorter than the sepals, and the very short-apiculate stamens seem to be the outstanding characters for separation. Unfortunately, I have not had complete material of either species for study.

47. ***Ternstroemia subserrata*** (Rusby) Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo subserrata Rusby in Bull. N. Y. Bot. Gard. **8**: 104. 1912.

DISTRIBUTION: Bolivia.

BOLIVIA: Cargadira, alt. 2500 m., *R. S. Williams* 1533 (TYPE, NY), July 30, 1902 (stout bush 7 ft. high).

Shrub with short, stout, gray-red, roughened branchlets. Leaves obovate, coriaceous, 4-7 cm. long, 2-3 cm. wide, obtusely acuminate at apex, tapering at base, the midrib canaliculate above, prominent below, the veins inconspicuous above, approximately 10 pairs elevated below with prominent reticulations, also dark-punctate below, the margin distinctly serrate, the petiole ca. 5-6 mm. long. Flowers solitary, abundant, the pedicel ca. 1 cm. long; bracteoles unequal, ovate-triangular, 1.0-1.5 mm. long and wide, glandular-denticulate; calyx-lobes suborbicular, ca. 4 mm. long, 4-5 mm. wide, outer lobes distinctly glandular-denticulate; petals obovate, very narrow at base, flaring toward apex, 6.5 mm. long, ca. 6 mm. wide, deeply emarginate at apex; stamens many, 130+, probably 4-seriate, the filaments variable in same flower, 1.0-2.5 mm. long, slender, joined at base, adnate to base of corolla, the anthers linear, ca. 1 mm. long, the connective slightly projected into a submuticous apex; ovary conical, ca. 2 mm. or less long,

ca. 2 mm. diam. at base, 2-celled, 3-ovulate, the style ca. 3 mm. long, the stigma sub-bi-peltate.

This species, like *T. asymmetrica*, is characterized by small floral parts. However, very outstanding are (1) the distinctly serrate leaves, conspicuously veined with obvious reticulations on the lower surface; (2) the many, 4-seriate stamens (130⁺) and (3) the very short petioles.

48. ***Ternstroemia Killipiana***, sp. nov.

Arbor 6–9 metralis, ramulis teretibus brunneis. Folia coriacea, oblongo-elliptica vel oblongo-obovata, 7–10 cm. longa et 2–3 mm. lata, aureo-viridia, undique opaca, apice acuminata, basi in petiolum attenuata, subtus sparse punctata, margine plana, integerrima vel apice leviter crenulata, costa supra canaliculata, subtus subtiliter elevata vel plana, nervis undique inconspicuis, petiolis 5–10 mm. longis. Flores solitarii, axillares, pedicellis brevibus 5–8 mm. longis, recurvatis; bracteolis 2 suboppositis ovato-triangularibus 2 mm. longis et 1.5–2.0 mm. latis, apiculatis, margine glanduloso-denticulatis; sepala 5, minuta, oblongo-aequilatera, fragilissima, 2–3 mm. longa et 1.5–2.0 mm. lata, apice subtruncata, basi leviter adnata, exterioribus glanduloso-denticulatis; petala minutissima, quam sepala breviora; stamina 2-seriata, ca. 60, inaequalia, 1.5–2.5 mm. longa, filamentis crassis vel gracilibus, 0.3–0.8 mm. longis, basi leviter connatis et ad basim corollae adnatis, antheris linearibus 1.2–1.5 mm. longis, connectivo apiculato vel mutico; ovarium conicum, breve, 1.5 mm. longum, basi 2 mm. diametro, 2-loculatum, loculis 2-ovulatis, stylo brevissimo, ca. 0.8 mm. longo, stigmate subcrenulato. Fructus ignotus.

DISTRIBUTION: Colombia.

COLOMBIA: Dept. Santander, Mesa de los Santos, in dense woods, alt. 1500 m., *E. P. Killip & A. C. Smith 15294* (TYPE, G; NY, US), Dec. 1926 (tree 25–30 ft.).

The very small flowers with short pedicels (5–8 mm. long), the minute calyx-lobes, not over 3 mm. long, and the equilateral truncate petals, even shorter than the calyx-lobes, are some of the more important distinguishing characters of this species. To these might be added the minute style which is less than 1 mm. long, and the tiny 2-celled ovary. The dull yellow-green, oblong-elliptic or near elliptic leaves, plane-margined and entire, are other distinctive characters.

This species is named for Mr. E. P. Killip, one of the collectors of the type specimen and an ardent student of the flora of Colombia.

49. ***Ternstroemia Mutisiana***, sp. nov.

Habitus ignotus. Rami ramulique grisei, verticillati. Folia coriacea, oblanceolata, 6.0–8.5 cm. longa et 1.5–2.5 cm. lata, apice longo-acuminata, basi longo-attenuata, margine plana, integerrima vel subcrenulata, costa supra leviter impressa, subtus subplana, venis invisibilibus, petiolis 5–10 mm. longis. Flores solitarii, pedicellis gracilibus 1.5–2.5 cm. longis; bracteolis 2 oppositis inaequalibus longo-triangularibus 2–3 mm. longis et 1.5–2.0 mm. latis, margine sparse glanduloso-denticulatis; sepala 5, imbricata, pergamentacea, ovata, inaequalia, 6–8 mm. longa et 4–5 mm. lata, exterioribus sparse glanduloso-denticulatis, interioribus margine scariosis; petala 5, ovata, 8–9 mm. longa et 4–6 mm. lata, basi connata; stamina circiter 40, uni-seriata, $\pm$ 4 mm. longa, filamentis crassis quam 1 mm. minus longis, antheris linearibus circiter 3 mm. longis, connectivo obtuse

projecto; ovarium conicum, circiter 1.5 mm. longum, 2-loculatum, loculis 2-3-ovulatis, stylo breve crassoque circiter 1.5 mm. longo et 1 mm. crasso, stigmatе subcapitato.

DISTRIBUTION: Colombia.

COLOMBIA: Precise locality lacking, *J. C. Mutis* 2461 (TYPE, US), 3916 (US), 1760-1808.

Ternstroemia Mutisiana is characterized by the simplicity of its appearance. The leaves are oblanceolate, tapering long at both extremities, the margin plane and entire, the midrib lightly impressed above, plane below, the veins not visible. The ovary is 2-celled, conical and thick, measuring 1.5 mm. from the base, tapering into a stout style of approximately the same length and nearly $\frac{2}{3}$ as thick. The stigma is subcapitate.

This species is named in honor of the early Colombian naturalist, José Celestino Mutis.

LITTLE KNOWN OR DUBIOUS SPECIES

1. *Ternstroemia cuneata* Poeppig ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 106 (Mém. Ternstr. 21). 1855. Nomen nudum. = ?

This undescribed species is merely recorded by Choisy. He states that the genus is unknown to him.

2. *Ternstroemia rubicunda* Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. Nomen nudum.

3. *Ternstroemia Ruiziana* Moricand in Mém. Soc. Phys. Genève, **7**: 257, t. 12. 1836. — Walpers, Repert. Bot. Syst. **1**: 368. 1842. — Choisy in Mém. Soc. Phys. Genève, **14**: 106 (Mém. Ternst. 18). 1855. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Mokofua Ruiziana (Moricand) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Moricand states that this species has angled branches, four bracteoles, a tubular corolla and a velutinous ovary. The leaves are distinctly dentate, sessile, and the veins are conspicuously raised on both surfaces.

There is no doubt in my mind that this species does not belong in the genus *Ternstroemia*. The tubular corolla (mentioned in the description and clearly illustrated) and the velutinous ovary immediately ban it from the genus. Four bracteoles, although unusual, are found in a single species, *T. heptasepala* Krug & Urban, in the West Indies.

A single leaf, taken from the type, was the only material available for my study. Although such a condition is not impossible, I have never seen a sessile-leaved specimen of *Ternstroemia* or one with leaves so conspicuously veined on both surfaces. In the illustration the anther appears much shorter than the filament, a feature not typical in *Ternstroemia*.

The description and illustration, while in a way revealing, are too poor to suggest generic classification.

4. *Ternstroemia roraimae* Klotzsch in Schomburgk, Fauna Fl. Brit.-Guiana, 1092. 1848. Nomen nudum.

5. *Ternstroemia venosa* Sprengel, Neue Entdeck. **2**: 162. 1821; Syst. Veg. **2**: 595. 1825. — De Candolle in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 411 (Mém. Ternstr. 19). 1822. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 108 (Mém. Ternstr. 20). 1855. — Wawra in Martius, Fl. Bras. **12**¹: 281. 1886.

Mokofua venosa (Sprengel) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

The outstanding characters of this little-known species are: 1. Dentate, lanceolate leaves (narrower than *T. dentata*), opaque and obscurely veined above, prominently veined below. 2. Flowers axillary, the peduncles *aggregate*, very short. 3. Calyx-lobes and bracteoles glandular-denticulate. 4. Corolla twice as long as the calyx. 5. Fruit two-celled, eight-seeded.

It is odd that a species so well described should be so little-known. Choisy (1855) and Wawra (1886) both treat it as dubious, the latter suggesting a close relationship with *T. dentata*. The type was collected by *Otto* in Brazil. Later Sprengel (1825) cites a second specimen collected by *Sello*, also from Brazil.

EXCLUDED SPECIES

Ternstroemia Steubelii Hieronymus in Bot. Jahrb. **21**: 320. 1896 = **Patascoya Steubelii** Urban in Bericht. Deutsch. Bot. Gesell. **14**: 282. 1896.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

NEW AND CRITICAL CHINESE AND INDO-CHINESE MYRSINACEAE¹

EGBERT H. WALKER

With two text-figures

THE following notes contain a few corrections for my Revision of the Eastern Asiatic Myrsinaceae,² needed changes in J. Pitard's treatment of this family in Lecomte's Flore Générale de l'Indo-Chine,³ and new species and additional records from the collections of W. T. Tsang made for Lingnan University and the Arnold Arboretum in southern Kwangtung and adjacent Tonkin, Indo-China. Most of the material was kindly lent me by Dr. E. D. Merrill, Director of the Arnold Arboretum, especially valuable being the collection of photographs, fragments, and duplicates of the Indo-Chinese collections named by J. Pitard in the Paris herbarium. In Pitard's treatment localities and collectors are cited, but not collectors' numbers. With the aid of this collection of fragments, the missing numbers have been ascertained in at least most cases, with reasonable certainty. The citation of collectors' numbers in this paper for specimens cited by Pitard must thus be considered as subject to some possibility of error. The abbreviations for the herbaria where cited specimens are deposited are: AA = Arnold Arboretum, G = Gray Herbarium, Mo = Missouri Botanical Garden, NY = New York Botanical Garden, and US = United States National Herbarium.

Maesa perlarius (Lour.) Merr. Trans. Amer. Philos. Soc. n. ser. **24**²: 298. 1935. Based on *Dartus perlarius* Lour. The type is not extant.

Maesa sinensis A. DC. Ann. Sci. Nat. II, Bot. **16**: 80. 1841. Based on *Gaudichaud* 279 (?) from southern China in the Delessert herbarium (not seen).

Maesa tonkinensis Mez, Pflanzenr. **9**(IV. 236): 34. 1902. Based on *Balansa* 1065 and 1066 from Tonkin (not seen).

Maesa tonkinensis var. *macrodonta* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 777. 1930. Based on Bon's collection from Kien-khé, Hanoi, Tonkin (not seen).

Maesa tonkinensis var. *Bonii* Pitard, l. c. Based on Bon's collection from Dung-trung, province of Thanh-hoa, Annam. A duplicate has been examined (AA).

Maesa tonkinensis var. *annamensis* Pitard, l. c. Based on several collections by Eberhardt from Annam. Duplicates of some of the cited specimens have been examined (AA).

Maesa tonkinensis var. *montana* Pitard, l. c. Based on *Jacquet* 632 from the plateau Lang-bian, Annam. A photograph and fragment have been examined (AA).

ADDITIONAL SPECIMENS SEEN: TONKIN. *Clemens* 3157 (US); *Pételet* 2290, 6307 (AA), 2357, 2358, 2359, 2363, 2364, 2373 (AA, US), 2374, 2989, 2990, 2992 (US); *Squires* 108 (NY, US).

¹ Published by permission of the Secretary of the Smithsonian Institution.

² E. H. Walker, A Revision of the eastern Asiatic Myrsinaceae. Philip. Jour. Sci. **73**: 1-258. fig. 1-37. 1940.

³ J. Pitard, Myrsinacées. In H. Lecomte, Flore Générale de l'Indo-Chine. **3**: 765-877. 1930.

Repeated attempts to separate into distinct species and varieties the Chinese specimens attributed to this species in my revision have failed. The species seems to be a variable one in respect to indumentum and leaf size, shape, and dentition. Pitard separates *M. perlarius* (Lour.) Merr. (there called *M. sinensis* A. DC.) and *M. tonkinensis* Mez on dentition of the leaves and pubescence of the calyx-tube, and differentiates four varieties of the latter on dentition and leaf size and shape. Because the above cited Pételot specimens show much variation in these respects, sometimes in the various parts of one specimen, it seems more reasonable to consider *M. tonkinensis* with its varieties as merely variations of *M. perlarius*. This same variability in the genus *Maesa* has been met before.

Ardisia (§ *Tinus*) *Helferiana* Kurz, Jour. Asiat. Soc. Bengal **42**²: 86, 1873. Based on *Helfer* (Kew distribution 3589) from Tenasserim in the Calcutta herbarium. A photograph has been examined (US).

Ardisia crispipila Merr. Univ. Calif. Publ. Bot. **13**: 139, 1936. Based on *Pételot 1861* collected by Du Pasquier from Tonkin. A fragment and photograph have been examined (AA).

Ardisia Helferiana var. *septrionalis* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 846, 1930. Based on *Balansa 1073* from Tonkin. A fragment has been examined (AA).

Ardisia albiflora Pitard, op. cit. p. 387. Based on *Eberhardt 3764* from Tonkin. A photograph and fragment have been examined (AA).

ADDITIONAL SPECIMENS SEEN: TONKIN: *Pételot 5968, 6474* (AA, US). COCHINCHINA: *Godefroy 808* (AA); *L. Pierre 2818* (AA, NY, US); *Poilane 673* (AA, US).

The Pierre and Poilane specimens here cited differ in their toothed leaves and more rusty pubescence. However, Kurz described this species as "entire or obsoletely repand-toothed." Color variation in tomentum is not a stable character. Certain differences in the various descriptions of these species lose significance when the specimens are compared.

Ardisia (§ *Tinus*) *solanacea* Roxb. Pl. Coromand. **1**: 27, *pl.* 27, 1795; Fl. Ind. **2**: 269, 1824. Originally described from India without mention of specimens.

Ardisia humilis Vahl forma *obovata* Mez, sensu Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 848, 1930. Based on 9 specimens from Cambodia and Cochinchina, including the following.

SPECIMENS SEEN: CAMBODIA: *Pierre 971* (AA) from Kuang Repoen in Tpong province. COCHINCHINA: *dePerry (Pierre 5321)* (AA); *Talmy* (AA); *Thorel 335* (AA).

Mez's treatment of *Ardisia humilis* Vahl is greatly confused, as has been pointed out by Merrill.⁴ Pitard attributes to Indo-China only forma *obovata* Mez. Among his 9 cited specimens *Thorel 335* is also cited by Mez. The above listed specimens, as well as Pitard's description of *A. humilis* forma *obovata* Mez, compare favorably with my concept of *A. solanacea* Roxb., based on only a few specimens from the type locality in Madras, India, and on various other specimens from southern Asia and China.

Ardisia (§ *Akosmos*) *oxyphylla* Wall. var. *cochinchinensis* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 851, 1930. Based on *Pierre 5319* from Cochinchina. Duplicates have been examined (AA, NY, US).

ADDITIONAL SPECIMENS SEEN: SOUTHERN KWANGTUNG: *W. T. Tsang 26710* (AA, US). TONKIN: near the Kwangtung-Kwangsi border, *W. T. Tsang 27003, 27487, 29009, 30350* (AA, US).

⁴ Lingnan Sci. Jour. **11**: 50, 1932.

All these specimens clearly belong to the same species, but until a critical study of the southern Asiatic material has been made it is impossible to verify the correctness of the association of Pitard's variety with Wallich's species, based on his collection no. 2291 from Penang. The species is attributed by Mez also to the Andaman Islands, Sumatra, and Borneo. Tsang's Kwangtung collection represents an extension of range into China. Pitard places the species in Section *Tinus*, probably assuming that the sepals are imbricate in anthesis. However, the flowers on the Pierre specimen do not have imbricate sepals, although they are broadly ovate. Hence, I have placed it tentatively in Section *Akosmos*. The leaves resemble closely those of *A. depressa* C. B. Clarke, but the sepals are different and the flowers much larger.

Ardisia* (§*Akosmos*) *depressa C. B. Clarke, in Hook. f. Fl. Brit. Ind. **3**: 522. 1882. Based on a J. D. Hooker and other specimens from India. A photograph of the first has been examined.

?*Ardisia micrantha* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 817. 1930. Based on *Balansa* 4812 from Tonkin. A photograph has been examined (AA).

?*Ardisia quinqueгона* var. *micranthera* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 827. 1930. Based on *Poilane* 10229, 10245, and 10927 from "Dent du Tigre, massif de Dong tri, prov. de Quang tri," Annam. Duplicates have been examined (AA).

ADDITIONAL SPECIMENS SEEN: TONKIN: *Pételot* 2368, 2370, 6465, 6468 (AA, US).

Ardisia depressa belongs in the complex of species of which the variable *A. quinqueгона* Bl. is the most common representative in eastern Asia. According to the interpretation in my revision, *A. depressa* is the western equivalent, varying only in minor respects, as in size of inflorescence, punctuation, prominence of lateral nerves in the leaves, and ribbed fruits. I have seen only a photograph of the type. Pitard has described several species and varieties in this same complex, of which only part can now be referred, and these with some doubt. When more adequate material has been studied there will doubtless be additional changes.

Ardisia* (§*Akosmos*) *quinqueгона Blume, Bijdr. Fl. Nederl. Ind. 689. 1825. Originally described from China without mention of specimens.

Bludhia pseudoquinqueгона Masamune, Trans. Nat. Hist. Soc. Formosa **29**: 184-185: 28. 1959. Based on *C. I. Lei 11* in the herbarium of Taihoku Imperial University, collected in Hainan. Duplicates of the type have been examined (AA, NY).

Although this widespread species is highly variable, I see no characters in Masamune's species justifying its recognition.

Ardisia quinqueгона Blume var. ***oblonga*** Walker, Philip. Jour. Sci. **73**: 77. 1940. Based on *F. C. How* 71089, from Hainan (examined, US).

SPECIMENS SEEN: *Pételot* 2414 (AA, US), 2416 (US), 2417, 6464 (AA, US), 6470 (AA), the first three from Sontoy province, the others from Thai Nguyen.

This variety, originally described from Hainan, differs from the typical form of the species in its larger, oblong sepals and smaller inflorescences. Most of the additional specimens cited above have about the same characters. In most of them also the typical lepidote scales are more or less modified into pseudohairs, that is, they are raised on minute stalks and are fimbriate, thus resembling minute but coarse branched hairs. This indument covers a larger proportion of the stems. Furthermore, the leaves

are mostly larger. If the interpretation of this variety be thus modified, the collection by Gressitt (no. 1758) from eastern Kwangtung, doubtfully referred to this species in the original treatment, may be admitted, thus giving the variety a decided increase in range. These variations need further study by means of additional material and field observations. The field data accompanying available specimens are quite insufficient. I have searched among the available duplicates and fragments of Pitard's species for material of like nature, but in vain. Certain of his species in this affinity, however, are not adequately represented by available specimens and hence are not thoroughly understood.

***Ardisia quinquegona* Blume var. *hainanensis* Walker, Philip. Jour. Sci. **73**: 76. 1940.** Based on Lingnan University (Canton Christian College) 18098 from Hainan (examined).

SPECIMENS SEEN: TONKIN: near the Kwangtung-Kwangsi border, *Tsang* 27414?, 28993, 29876, 30226 (AA, US). KWANGTUNG: near the Tonkin border, *Tsang* 26500, 26587 (AA, US).

These specimens have the characteristic larger, narrowly triangular sepals, and somewhat smaller inflorescences. They are less distinct, however, than the Hainan specimens on which the variety was based, and tend toward var. *oblonga* Walker.

***Ardisia* (§*Akosmos*) *austroasiatica* Walker, nom. nov.**

Ardisia floribunda Wall. in Roxb. Fl. Ind. **2**: 272. 1824; Wall. List, no. 2263. 1830 (not *A. floribunda* Roem. & Schult. Syst. Veg. **4**: 804. 1819). Based on *Wallich* 2263, in the Geneva herbarium. A photograph of the duplicate in the Kew herbarium has been examined.

Ardisia yunnanensis Mez in part, misapplied by Walker, Philip. Jour. Sci. **73**: 64. 1940.

A shrub or small tree up to 3 m. high, the branchlets, inflorescences and petioles densely ferruginous-lepidote when young; leaves petiolate (up to 1 cm.), the blade chartaceous to coriaceous, narrowly oblong-lanceolate to oblanceolate, acute and narrowly decurrent on petiole at base, rather slenderly acuminate at apex, 12–15 cm. long, 2–4 cm. wide, entire, sometimes with reflexed margin, nearly equally green on both sides, glabrous, obscurely punctate, the glands not black, the midrib prominently raised beneath, the lateral nerves numerous (more than 20 pairs), fine, very inconspicuous, diverging at a wide or nearly right angle, straight or curved-ascending, not forming a distinct marginal nerve; inflorescences lateral, sometimes appearing terminal, more or less ferruginous-lepidote or puberulent, distinctly pyramidal-paniculate, 10–20 cm. long, the peduncle 1–8 cm. long, the pedicels (about 5 mm.) subumbellate on racemose primary branches (1–3 cm. long), the bracts linear, up to 7 mm. long, ciliate, caducous; flowers red or pink, about 4 mm. long; sepals shortly united at base, ovate to elliptic-ovate, acute to subrounded, 1.5–2 mm. long, ciliate or fimbriate, sometimes punctate, lepidote; petals ovate, acute, punctate with small dots mostly near apex, glabrous; stamens $\frac{2}{3}$ length of petals, the anthers ovate to lanceolate, sharply acute to abruptly mucronate, blackish or obscurely punctate on back; pistil equaling or exceeding petals; fruit unknown.

SPECIMENS SEEN: YUNNAN: *Henry* 11994 (AA, NY). BURMA: *Ward* 496 (AA). NEPAL: *Wallich* 2263 (photo. at AA). INDIA: *Griffith* (Kew distrib. 3575) (G); *Strachey & Winterbottom* 1 (G).

The Henry collection from Yunnan was cited erroneously under *Ardisia yunnanensis* Mez in my revision, p. 64–65. Comparison with the other specimens cited and with a photograph of *Wallich* 2263 in the Kew herbarium (designated as the type of *A. floribunda* Wall., but probably a duplicate, the actual type probably being in Geneva) shows clearly that *A. yunnanensis* Mez, based on *Henry* 13095, is not the same as *A. floribunda* Wall., thus adding the latter species to the list of those known from China. For additional notes see the end of the next description.

***Ardisia* (§*Akosmos*) *yunnanensis* Mez**, Pflanzenr. **9**(IV. 236): 107. 1902. Based on *Henry* 13095 from Yunnan in the Berlin herbarium. Duplicates have been examined (AA, Mo, NY, US).

The following description should replace that given in my revision, p. 64:

A tree up to 10 m. high, the branchlets, inflorescences and petioles ferruginous-lepidote when young; leaves petiolate (up to 1.5 cm.), the blade chartaceous, oblong-lanceolate to oblanceolate, acute at base, acute or acuminate at apex, 12–22 cm. long, 3–4.5 cm. wide, entire, glabrous, obscurely punctate, dull green above, paler brownish and ferruginous-lepidote with prominently raised midrib beneath, the lateral nerves numerous (more than 20 pairs), fine, slightly raised above, more so beneath, diverging at nearly a right angle, straight half-way to margin then curved-ascending, not uniting in a definite marginal nerve, the veinlets obscure, reticulate; inflorescences lateral or subterminal, generally supra-axillary, compound-subumbellate or cymose, ferruginous-lepidote or puberulent, 5–9 cm. long, the peduncle 2.5–4 cm. long, the primary branches scattered, the pedicels about 5 mm. long, the bracts inconspicuous, lanceolate to subulate, 2 mm. long, ciliate; flowers white, about 3 mm. long; sepals united about $\frac{1}{3}$ their length, triangular-ovate to lanceolate, sharply acute, 1–1.5 mm. long, ciliate, not punctate, lepidote; petals ovate, acute, not punctate, glabrous; stamens nearly equaling petals, the anthers ovate, obtuse or acute, mucronate, not punctate on back; pistil equaling or longer than petals; fruit about 7 mm. in diameter, brownish, not punctate, obscurely longitudinally ribbed.

SPECIMENS SEEN: (See my revision, p. 64–65, exclusive of *Henry* 11994).

Ardisia yunnanensis appears in two places on page 51 in my key to species of *Ardisia*. As here revised, the first occurrence, lines 4 and 5, will be *A. floribunda*. These two species may be differentiated as follows:

1. Tree to 10 m.; lateral nerves clearly evident beneath; inflorescence 10–20 cm. long, subumbellate or cymose; fls. white, 3 mm. long; sepals triangular-ovate to lanceolate, acute; petals not punctate; anthers not punctate. *A. yunnanensis* Mez
2. Shrub to 3 m.; lateral nerves very inconspicuous beneath; inflorescence 5–10 cm. long, paniculate; fls. red or pink, 4 mm. long; sepals ovate to elliptic-ovate, acute to subrounded; petals punctate; anthers blackish or obscurely punctate.
 *A. floribunda* Wall.

***Ardisia* (§*Crispardisia*) *crassinervosa* Walker**, Philip. Jour. Sci. **72**: 86. 1940. Based on Lingnan University (Canton Christian College) 17423 (examined).

Ardisia crispa var. *angusta* (Clarke) Mez, Pflanzenr. **9**(IV. 236): 145. 1902, misapplied (and misspelled *angustata*) by Pitard, in Lecomte, Fl. Gén. Indo Ch. **3**: 863. 1930.

SPECIMENS SEEN: ANNAM: *Poilane* 8624 (AA, NY). *Thorel* 849 (AA).

Poilane 8624 is apparently the specimen referred by Pitard to this variety.

I have compared it with the type at Kew, of *A. crenata* var. *angusta* C. B. Clarke, *Griffith* (Kew distribution 3584), and find it to be quite different. Pitard may have cited *Thorel* 849 under *Ardisia crispa* A. DC., but there are no data on the Arnold Arboretum specimen to identify it with Pitard's citation on p. 863.

Ardisia (§*Crispardisia*) **elegans** Andr. Bot. Repos. **10**: pl. 623. 1810. Based on a cultivated specimen in England, originally from the Island of Penang (not seen).

Ardisia Thorelii Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 869. 1930. Based on Thorel's unnumbered collection from Paklai, Laos. A fragment has been examined (AA).

ADDITIONAL SPECIMENS SEEN: TONKIN: *Balansa* 1069 (fragment AA); *Fleury* 32132 (fragment AA); *Pételot* 1046 (US, NY), 2219, 6467 (US), 4379 (AA, US).

Nine specimens, including the above cited Balansa, Fleury, and Thorel specimens, were cited with the original description of *A. Thorelii* Pitard. All the specimens here mentioned compare very favorably with the south China material attributed to this species in my revision. *Ardisia patens* var. *tonkinensis* Pitard is certainly very closely related. In my revision *A. patens* Mez is considered as a synonym of *A. maculosa* Mez, which is the western equivalent of *A. elegans* Andr. Further examination of these three species and varieties may show still closer affinity.

Ardisia (§*Crispardisia*) **kwangtungensis** Walker sp. nov.

Frutex circa 45 cm. altus caule minutissime puberulo glabrescenti plerumque non ramoso praeter ramulis specialibus floriferis. Folia petiolo anguste alato, 5 mm. longo vel brevior, chartacea vel coriacea, anguste lanceolata vel oblongo-lanceolata, graciliter acuta, basi cuneato-acuta et decurrentia, 7-11 cm. longa, 1-2 cm. lata, integra, margine reflexa, supra obscure viridia et non punctata, subtus brunnescentia et obscure lepidota, glabra, costa subtus elevata, nervis lateralibus principalibus circa 8-jugis, supra non conspicuis subtus non prominulis, praecipue in angulis patulis divergentibus, curvato-adscendentibus, in nervo marginale definito terminantibus, nervis intermediis minus conspicuis brevioribus et in nervo marginale non terminantibus, glandulis marginalibus per nervum marginalem dispositis. Inflorescentiae minutissime puberulae, circa 7-florae, simplices, subumbellatae in apicibus uncatis ramulorum specialium lateralium floriferorum 5-11 cm. longorum, prope apicem foliis paucis donatorum, pedicellis circa 1 cm. longis. Flores ignoti. Sepala frugifera ovata vel late ovata, 2 mm. longa, non valde imbricata (sepala etiam florentia forsitan imbricata), non punctata plus minusve minutissime puberula scariosa.

Type in the herbarium of the Arnold Arboretum, collected by W. T. Tsang, no. 26628, in a thicket on dry clay soil near Na Leung, Fan Ch'eng District, southern Kwangtung province, China, Aug. 1-10, 1936, on an expedition along the Kwangtung-Tonkin border; duplicate in the United States National Herbarium.

If the sepals in flower are distinctly more imbricate than they are in fruit this species may be considered related to *Ardisia nervosa* Walker. It is distinguished, however, by its narrower leaves with inconspicuous rather than prominent lateral nerves, and puberulent rather than glabrous inflorescences.⁵ If the sepals are not imbricate enough to relate it to *A. nervosa*

⁵ In the key to the species of *Ardisia* in my Revision of the Eastern Asiatic Myrsinaceae, Philip. Jour. Sci. **73** (1940), this species would come under f² on page 54. The above characters will distinguish it at that point from *A. nervosa*.

Walker, it would appear to be related to *A. punctata* Lindl., from which it is plainly distinguished by the narrower leaves and the marginal nerves close to the edge of the leaves rather than at some little distance.⁶ Also its inconspicuous marginal glands placed along the marginal nerve, rather

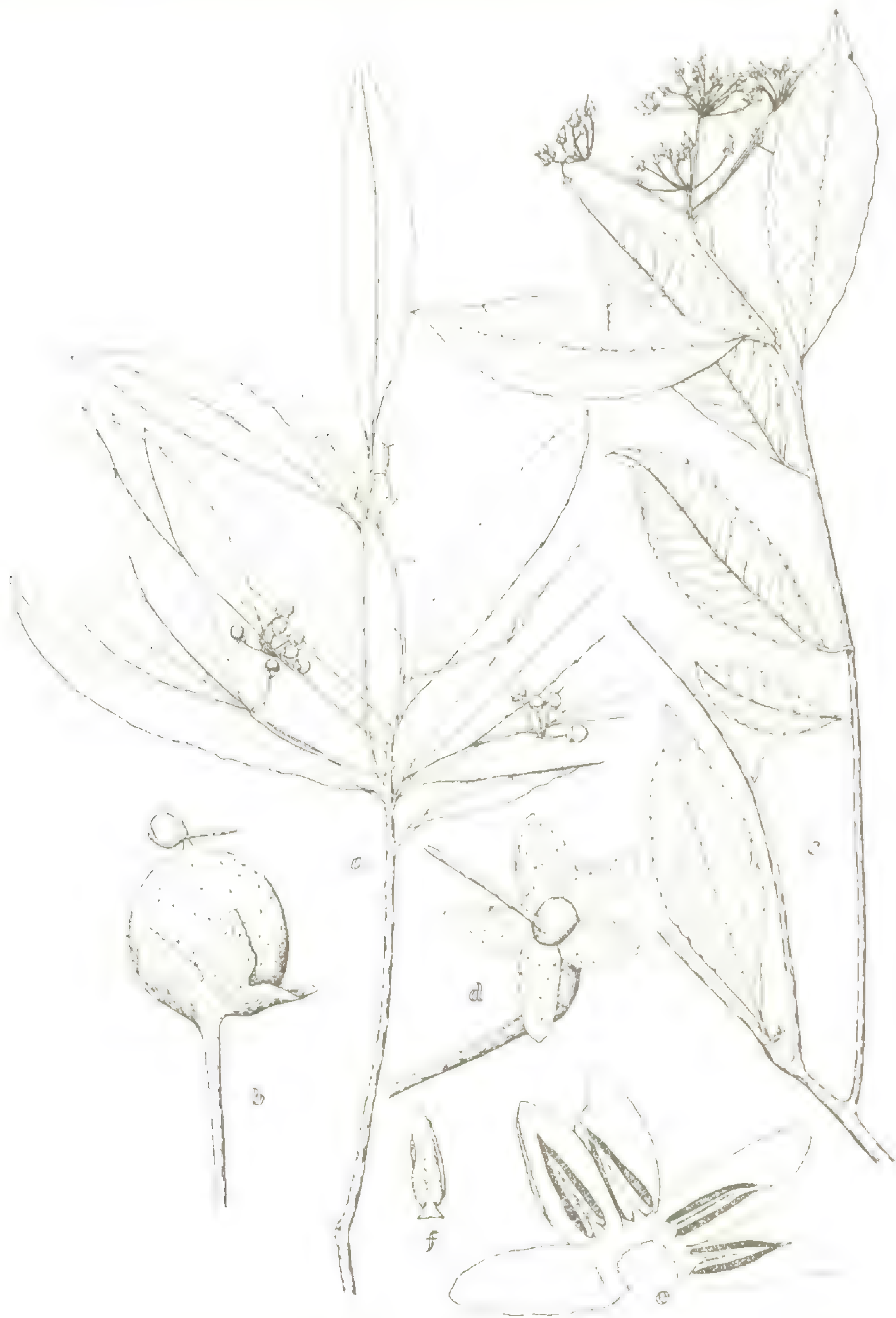


FIG. 1. *a, b. Ardisia kwangtungensis* Walker, drawn from the type: *a.* habit, $\times \frac{1}{3}$; *b.* fruit, $\times 3$. *c-f. Ardisia Merrillii* Walker, drawn from the isotype in the U. S. National Herbarium: *c.* habit, $\times \frac{1}{3}$; *d.* calyx and pistil, $\times 3$; *e.* corolla with stamens, $\times 3$; *f.* stamen, back view, $\times 3$.

⁶ In the key to *Ardisia* in my revision (see preceding footnote) this species would come to the 7th line on p. 55. The above characters will distinguish it at that point from *A. punctata*.

than on the edge of the leaf, are distinctive. This feature, however, might not appear to be so characteristic in other specimens.

Ardisia (§*Crispardisia*) **Merrillii** Walker sp. nov.

Frutex 2 m. altus, caule erecto viridi fortasse non ramoso praeter ramulis specialibus floriferis. Folia petiolo 5–8 mm. longo, chartacea vel coriacea, elliptico-lanceolata, acuta vel acuminata, basi acuta, 7–10 cm. longa, 2–3.5 cm. lata, integra sed glandulis marginalibus numerosis intrusis, glabra, subtus vix pallidiora et minutissime lepidota, costa subtus elevata, nervis lateralibus 13–15-jugis crassis prominenter elevatis in nervo marginale non terminantibus venulis utrinque elevatis reticulata. Inflorescentiae minutissime puberulae, duplicato corymbosae, in apicibus ramulorum specialium lateralium floriferorum 11–30 cm. longorum foliis per plus quam superiorem trientem instructorum, axibus primariis 2.5–5 cm. longis, umbellis usque ad 8-floribus terminantibus, pedicellis 5–13 mm. longis. Flores 6 mm. longi, albi, odorati, sepalis tenuibus non valde imbricatis, ovatis vel oblongo-ovatis obtusis vel rotundatis, 2.5–3 mm. longis, non punctatis, dorso glabris obscure venosis, intus rubro-lepidotis vel subtiliter rubro-lineolatis, petalis albis, ovatis, obtusis vel rotundatis, 6 mm. longis, non punctatis, staminibus quam petalis dimidio brevioribus, antheris lanceolatis longe acutis apiculatis dorso non punctatis pistillo petalis subaequilongo. Fructus ignotus.

Type in the herbarium of the Arnold Arboretum, collected by *W. T. Tsang*, no. 28985, in a thicket on dry sandy soil near Chan Uk village near Chuk-phai, Ha-coi Tonkin, Indo-China, May 3–10, 1939, on the third Indo-Chinese expedition of Lingnan University; duplicate in the United States National Herbarium.

This species seems nearest related to *Ardisia nervosa* Walker, known only from Hainan, from which it differs in its thicker lateral nerves not uniting in a definite marginal nerve, its nonpunctate flowers with smaller and thinner sepals not veined within. It resembles *A. conspersa* Walker and related species in its inflorescences and in its special flowering branches with leaves on more than the upper third, but is distinct in its characteristic prominent leaf-venation.

Ardisia (§*Crispardisia*) **pedalis** Walker, sp. nov.

Suffrutex vix 30 cm. altus, caulibus erectis e rhizomate, minutissime puberulis, glabrescentibus. Folia petiolo ca. 5 mm. longo, coriacea, elliptico-lanceolata, longe acuminata, basi gradatim acuta, 6–10 cm. longa, 14–33 mm. lata, integra sed glandulis marginalibus intrusis, atro-punctata praecipue subtus, supra glabra, subtus minutissime puberula, praecipue costa elevata, nervis lateralibus non conspicuis, circa 9-jugis in nervo marginale non terminantibus. Inflorescentiae minutissime puberulae, simplices, subumbellatae, in apicibus uncatis ramulorum specialium floriferorum supra-axillarium 2–4 cm. longorum, praecipue prope apicem foliis reductis paucis instructorum, pedicellis 7–12 mm. longis. Flores 6 mm. longi albi odorati, sepalis non valde imbricatis, ovatis, acutis, 2 mm. longis, atro-punctatis puberulis, petalis ovatis vel oblongo-ovatis obtusis, 6 mm. longis, conspicue atro-punctatis extra glabris, staminibus quam petalis $\frac{1}{3}$ – $\frac{1}{4}$ brevioribus, antheris lanceolatis acuminatis apiculatis dorso leviter atro-punctatis, pistillo petalis subaequilongo. Fructus circa 5 mm. diametro, punctatus.

Type in the herbarium of the Arnold Arboretum, collected by *W. T. Tsang*, no. 29228, in a thicket on dry sandy soil near Chan Uk village near Chuk-phai, Ha-coi,

Tonkin, Indo-China, June 10-12, 1939, on the third Indo-Chinese expedition of Lingnan University; duplicate in the United States National Herbarium. An additional specimen is *W. T. Tsang* 27321 from a similar habitat on Taai Wong Mo Shan near the same village, collected Nov. 18 - Dec. 2, 1936.

This species perhaps resembles most closely *Ardisia affinis* Hemsl., but differs in its larger, slender, long-acuminate leaves and in its strongly punctate and larger flowers. Its small size, from which is derived its specific name, and its prominent rhizome may, of course, be more characteristic of the one known collection rather than of the species. Rhizomes are probably



FIG. 2. *a, b. Ardisia Tsangii* Walker, drawn from the type: *a.* habit, $\times \frac{1}{3}$; *b.* fruit with adherent calyx, $\times 3$. *c, d. Ardisia pedalis* Walker, drawn from the type: *c.* habit, $\times \frac{1}{3}$; *d.* flower, $\times 3$.

more characteristic of all species of *Ardisia* than seems to be the case, because they are so seldom collected except with the smaller species. The short, slender, special flowering branches, with or without leaves, and the abundantly punctate flowers without prominently punctate anthers are also characteristic.

Ardisia (§*Crispardisia*) **Tsangii** Walker, sp. nov.

Frutex fortasse non plus quam 1 m. altus, caule erecto minutissime puberulo glabrescenti, plerumque non ramoso praeter ramulis specialibus floriferis. Folia petiolo 2–5 mm. longo, chartacea, elliptico-lanceolata, longe acuta vel aliquantulum acuminata, basi cuneata, 9–12 cm. longa, 2–3.5 cm. lata, integra, margine reflexa, glandulis marginalibus obscurissimis, glabra, supra dilute viridia, subtus nonnihil pallidiora et nonnumquam lepidota, atro-punctata, costa subtus elevata, nervis lateralibus principalibus 12–15-jugis, elevatis in nervo marginale aequaliter prominulo terminantibus, nervis intermediis minus conspicuis brevioribus et in nervo marginale non terminantibus, venulis elevatis reticulatis. Inflorescentiae minutissime puberulae, simplices, subumbellatae in apicibus uncatis ramulorum specialium lateralium floriferorum 5–8 cm. longorum prope apicem foliis paucis instructorum pedicellis 1–1.5 cm. longis. Flores ignoti, sepala frugifera late ovata obtusa ad rotundata, 2–2.5 mm. longa, florentia fortasse imbricata, punctata, lepidota, ciliolata. Fructus globosus circa 6 mm. diametro (maturitate?), rubescens, valde atro-punctata.

Type in the herbarium of the Arnold Arboretum, collected by *W. T. Tsang*, no. 30707, on Ho Yuag Shan, Tien-yen, Tonkin, Indo-China, near the Kwangtung-Kwangsi-Tonkin border, Oct. 13 – Nov. 22, 1940, on an expedition by Lingnan University; duplicate in the United States National Herbarium.

Because of the very obscure marginal glands, this species might seem to belong in Section *Tinus*. However, its subumbellate inflorescences on special lateral leaf-bearing flowering branches are characteristic of Section *Crispardisia*. Its very broad sepals relate it to *A. crassinervosa* Walker and to *A. nervosa* Walker. From the former it is distinguished by its larger and less prominently veined leaves, and from the latter by the absence of nerves on the inside of the smaller sepals.

Ardisia (§*Crispardisia*) **villosoides** Walker, Philip. Jour. Sci. **72**: 93. 1940. Based on *F. C. How* 72747 from Hainan (examined [US]).

ADDITIONAL SPECIMEN SEEN: TONKIN: *Pételot* 2418 (AA, US) border of stream in an open moist forest, Tu Phap, Province of Sontoy, June 15, 1940.

This species was previously known only from the type locality.

Ardisia (§*Crispardisia*) **virens** Kurz, For. Fl. Burma **2**: 575. 1877; Jour. Asiat. Soc. Bengal **46**²: 226. 1877. Based on a collection by J. Anderson from Burma (not seen).

Ardisia stellifera Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 863. 1930. Based on *Eberhardt* 3082 from Annam. A fragment has been examined (AA).

Ardisia evonymifolia Pitard, op. cit. p. 865. Based on *Poilane* 2259 and *Spire* 372 from Laos. Fragments have been examined (AA).

Ardisia tonkinensis A. DC. Rep. Sp. Nov. **8**: 354. 1910. Based on *Bon* 2912 from Tonkin. A duplicate has been examined (AA).

Ardisia virens var. *annamensis* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 868. 1930. Based on *Poilane* 10370 from Annam. A duplicate has been examined.

ADDITIONAL SPECIMENS SEEN: TONKIN: *Pételot* 2407, 2466⁷ (AA), 4292, 4297, 4300, 6466⁷ (US), 6482 (AA, US).

The interpretation of this species in my revision recognized considerable variation, with only a suggestion of any coordination with geographic distribution (see p. 84). Several of Mez's species were placed as synonyms, and reference was made to Pitard's related species. Further comparison of fragments and duplicates of his specimens with the Chinese and Formosan material and with a photograph received from Calcutta of *Griffiths* (Kew Distrib. 3561), cited by both Mez and Clarke,⁸ only strengthens my belief that this is a very variable species and not subject to subdivision, at least until much more material can be assembled. There is much variation in size and shape of leaf and of sepals. In comparing the descriptions item by item the apparent variations seem to be further confused by variant uses of words. The possession of specimens from Sumatra and Siam, which seem to belong in this variable population, further emphasizes the need to postpone subdivision, if indulged in at all.

Ardisia* (§*Bladhia*) *gigantifolia Stapf, Kew Bull. 1906: 74. 1906. Based on a specimen in the Kew herbarium grown by J. Veitch & Sons in England in 1901 from seed sent from "South China" by E. H. Wilson. A photograph has been examined.

Ardisia kteniophylla A. DC. Rep. Sp. Nov. 8: 354. 1910. Based on *Bon* 3158 from Tonkin (not seen).

SPECIMENS SEEN: TONKIN: *Pételot* 6469 (AA, US); *W. T. Tsang* 29012 (AA, US).

Although the type of DeCandolle's species has not been seen, a fragment (AA) from the type in Paris of *A. kteniophylla* var. *microdonta* Pitard, *Poilane* 3097, has been examined. The only significant difference in the descriptions of *A. gigantifolia* Stapf and *A. kteniophylla* A. DC. seems to be in the smaller number of lateral nerves of the latter. Although Pitard's variety seems to be indistinguishable from the species, there is as yet insufficient material on which to base a reduction.

Embelia* (§*Heterembelia*) *oblongifolia Hemsl. Jour. Linn. Soc. Bot. 26: 62. 1889. Based on *Ford* [90] from Kwangtung. A photograph has been examined.

SPECIMENS SEEN: TONKIN: near the Kwangtung border, *W. T. Tsang* 29567 (AA, US).

This species has not been previously reported from Indo-China.

Embelia* (§*Micrembelia*) *polypodioides Hemsl. & Mez, Notizbl. Bot. Gart. Berlin 3: 108. 1901. Based on *Henry* 10060A from Yunnan. A duplicate has been examined (AA).

SPECIMEN SEEN: TONKIN: *Pételot* 1790 (US).

This species has not previously been recorded from Indo-China.

Myrsine stolonifera (Koidz.) Walker, comb. nov.

Myrsine marginata Mez, in Pflanzenr. 9(IV. 236): 339. 1902 (not *M. marginata* Hook. & Arn. 1834). Based on *Faber* 96 and 657 from Chekiang. Duplicates have been examined.

⁷ This specimen bears exactly the same data as no. 6466 in the U. S. National Herbarium and appears to be the same collection, but the discrepancy in collector's numbers is unmistakable.

⁸ In Hook. f. Fl. Brit. Ind. 3: 524. 1882.

Anamtia stolonifera Koidz. Bot. Mag. Tokyo **37**: 40. 1923. Based on a collection by Koidzumi, Sept. 1912 from Prov. Yamato, Japan (not seen).

The name *Myrsine marginata* Mez, used in my revision through oversight, is untenable because of *M. marginata* Hook. & Arn. Jour. Bot. Hook. **1**: 283. 1834, which Mez recognized as a synonym of *Chrysophyllum marginatum* Radlk. The next oldest name is *Anamtia stolonifera* Koidz. This is unfortunate because, if this plant bears stolons, probably only those who know the growing plant have seen them. G. Masamune in 1931⁹ proposed *Anamtia Mezii* to replace *Myrsine marginata* Mez, but the reason for not using the name *Anamtia marginata* published by the same author in 1929¹⁰ was not given.

Rapanea neriifolia (Sieb. & Zucc.) Mez, Pflanzenr. **9**(IV. 236): 361. 1902. Based on *Myrsine neriifolia* Sieb. & Zucc. Possible duplicates of the type have been examined.

Rapanea capitellata var. *microcarpa* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 788. 1930. Based on two collections by Poilane. Duplicates of the first, no. 5968, have been examined (AA, NY).

ADDITIONAL SPECIMENS SEEN: SOUTHERN KWANGTUNG: *W. T. Tsang* 26574, 26744 (AA, US). TONKIN: near the Kwangtung-Kwangsi border, *W. T. Tsang* 27501, 29037, 29936, 30200 (AA, US).

Pitard lists two varieties of *Rapanea capitellata* (Wall.) Mez and *R. cochinchinensis* Mez as occurring in Indo-China. It seems advisable, however, to consider *R. capitellata* var. *microcarpa* Pitard as a synonym of the common southern China species, at least until a thorough study can be made of all the southern Asiatic species of this genus. Merrill¹¹ has also recorded *R. linearis* (Lour.) S. Moore for Indo-China.

Rapanea neriifolia var. *yunnanensis* (Mez) Walker, Bull. Fan. Mem. Inst. Biol. Bot. Ser. **9**: 189. 1939. Based on *Rapanea yunnanensis* Mez. Duplicates of the type, *Henry* 11570, *B*, and *C*, have been examined.

Rapanea capitellata var. *macrocarpa* Pitard, in Lecomte, Fl. Gén. Indo-Ch. **3**: 787. 1930. Based on *Poilane* 6916 from Annam. A duplicate has been examined (AA).

ADDITIONAL SPECIMENS SEEN: TONKIN: near the Kwangtung-Kwangsi border, *W. T. Tsang* 27197 (AA, US); *Pételot* 6232 (AA, US).

Merrill¹² has already reported this variety from Indo-China, based on *Pételot* 7950 from Tonkin, although as *Rapanea yunnanensis* Mez. That specimen, however, is less characteristic of this variety than is *Pételot* 6232.

U. S. NATIONAL HERBARIUM,
WASHINGTON, D. C.

⁹ Jour. Soc. Trop. Agr. **3**: 22. 1931.

¹⁰ G. Masamune, A preliminary report on the vegetation of the island of Yakusima. 107. 1929.

¹¹ E. D. Merrill, A commentary on Loureiro's "Flora Cochinchinensis." Trans. Amer. Philos. Soc. n. ser. **24**²: 300. 1935.

¹² Jour. Arnold Arb. **19**: 61. 1938.

DEGENERIACEAE, A NEW FAMILY OF FLOWERING PLANTS FROM FIJI

I. W. BAILEY AND A. C. SMITH

With five plates

IN 1934 the junior author collected specimens of a fruiting tree on the Fijian island of Vanua Levu, but efforts to place the plant in a family failed. Neither fruit nor foliage suggested any plant previously known from the Pacific. Although wood from the trunk was available, no definite suggestion of a family could be made by those who examined the specimen. Recently, a re-examination of the wood and a study of the internal structure of the twigs and leaves indicated that the plant is related to the Magnoliaceae, and it has subsequently been ascertained that the plant is conspecific with a tree collected in flowering condition in the interior of Viti Levu by Mr. Otto Degener in 1941.

This Fijian plant, which is now represented by ample foliage, flowers, fruits, and wood, is definitely a member of the ranalian complex. It exhibits close similarities to the Magnoliaceae, particularly in the internal structure of its vegetative organs, in its pollen, and in the vascularization of its stamens. However, we cannot place it in the Magnoliaceae, for reasons to be discussed on succeeding pages, without expanding the current concept of that family to an unwarranted degree and certainly far beyond the limits proposed by Dandy (in Kew Bull. **1927**: 257–264. 1927) and Hutchinson (Fam. Fl. Pl. Dicot. 81. 1926). Another comparatively close relative of the new plant is the genus *Himantandra* F. v. Muell.,¹ originally believed to be a member of the Annonaceae, but since — and we believe correctly — established as representing the unigeneric family Himantandraceae (Diels in Bot. Jahrb. **55**: 126. 1917).

These three families, Magnoliaceae (sensu stricto),² Himantandraceae, and the proposed Degeneriaceae, form a group with salient morphological similarities. They are differentiated from more remotely related families such as the Eupomatiaceae, Annonaceae, Winteraceae, Trochodendraceae, etc. by fundamentally significant differences which we shall consider in future detailed treatments of these groups. For the purposes of the present paper, the relationships of the new plant need not be considered beyond the Magnoliaceae, Himantandraceae, and Winteraceae. Following the

¹ The use of the name *Himantandra* F. v. Muell. rather than *Galbulimima* F. M. Bailey is discussed in detail in the following article in this Journal.

² Whenever mentioned in the following pages, the family Magnoliaceae is intended in the restricted sense, as interpreted by Dandy, Hutchinson, and many other recent students.

technical description of the new genus and species, we shall discuss the salient internal morphological features of the plant. The remarkable stamens and carpel of *Degeneria* deserve special consideration, since they are likely to prove of some significance in future discussions of the floral morphology of the angiosperms.

It is a privilege to associate the name of the new plant with that of Mr. Otto Degener, collector of the type specimen and author of *Flora Hawaiianis* and numerous other works on Pacific botany. We are indebted to Dr. J. Hutchinson, of the Royal Botanic Gardens, Kew, for his kindness in sending us floral material of *Himantandra*, and to Dr. A. O. Dahl for verifying our interpretation of the pollen morphology of *Degeneria*. Figures 1-11 were drawn by Mr. Gordon W. Dillon and figures 12-14 by Dr. Charlotte G. Nast. We are further indebted to Dr. Nast for the preparation of serial sections of the vegetative and floral organs of our plant.

Degeneriaceae fam. nov.

Familia characteribus generis unici.

Degeneria gen. nov.

Arbor, stipulis nullis, foliis alternatis simplicibus pinnatinerviis. Flores solitarii supra-axillares hermaphroditi. Sepala et petala disparia, calyce rotato, sepalis quam petalis multo minoribus, petalis pluriseriatis carnosissimis imbricatis, toro coriaceo subgloboso vel convexo, centro sub ovario depresso. Stamina hypogyna plura carnosissima complanata, loculis 4 binis parallelis extrorsis immersis rimis 2 longitudinalibus dehiscentibus. Staminodia intra stamina et quam stamina pauciores, textura similia. Carpellum unicum inaequilateraliter ellipsoideum, partibus ventralibus approximatis diffuse stigmatiferis, loculo unico, ovulis numerosis biseriatis, placentis 2 sutura ventrali parallelis. Fructus indehiscens, seminibus numerosis biseriatis, alteris sessilibus, alteris funiculo filiformi suspensis.

Degeneria vitiensis sp. nov.

Arbor ubique glabra, ramulis subrectis teretibus crassis (apicem versus 3-8 mm. diametro) fusco-nigrescentibus rugulosis saepe fistulosis; petiolis gracilibus (1.5-3 mm. diametro) rugulosis supra canaliculatis 2-6.5 cm. longis basi incrassatis; laminis chartaceis vel subcoriaceis siccitate utrinque fuscis ellipticis vel obovato-ellipticis, 9-27 cm. longis, 3.5-13.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice rotundatis vel leviter emarginatis, margine integris et leviter revolutis, supra subnitidis, costa supra subplana vel interdum leviter canaliculata subtus prominente et rugulosa, nervis secundariis utrinsecus 10-18 cum aliis debilioribus interspersis divergentibus marginem versus anastomosantibus et rete venularum intricato utrinque conspicue prominulis; pedicellis sub anthesi 2-3 cm. longis gracilibus nigrescentibus rugulosis apicem versus gradatim incrassatis, bracteis 2 vel 3 coriaceas ovatas obtusas 1-1.5 mm. longas gerentibus vel cicatricibus ornatis; calyce coriaceo sub anthesi 8-9 mm. diametro profunde lobato, sepalis 3 ovato-deltoides 3.5-5 mm. longis et latis ubique obscure luteo-glandulosis, apice obtusis, margine anguste scariosis subintegris (vel obscure erosulis) inconspicue ciliatis (pilis circiter 0.15 mm. longis); petalis 12 vel 13 ut videtur 3-4-seriatis concavis apicem versus plus

minusve cohaerentibus, elliptico-oblongis (vel interioribus obovatis), apice et basi rotundatis, ubique obscure luteo-glandulosi, margine pilis simplicibus ad 0.6 mm. longis decidue ciliatis, exterioribus maximis 18–19 mm. longis et 10–12 mm. latis, interioribus crassissimis et minimis circiter 12 mm. longis et 6 mm. latis; staminibus circiter 20 congestis plus minusve 3-seriatis oblongis vel obovato-oblongis, 4.5–6 mm. longis, 1.5–2.5 mm. latis (interioribus angustissimis), apice rotundatis vel subtruncatis et ibi ut petalis ciliatis, obscure luteo-glandulosi, loculis 2–3.5 mm. longis; staminodiis 11 vel 12 spathulato-oblongis, circiter 6 mm. longis et apicem versus 1.5–2.5 mm. latis, apice rotundatis et conspicue introrse cucullatis; carpello sub anthesi circiter 5.5 mm. longo, 3 mm. lato, et 2 mm. crasso, basi obtuso, apice subrotundato, marginibus stigmatiferis 3–4 mm. longis undulatis, ovario crasse carnosio luteo-glanduloso, loculo lineari-oblongo circiter 4 mm. longo parti ventrali oblique parallelo, ovulis 24 vel 26 oblongis sub anthesi circiter 0.5 mm. longis utrinque rotundatis; pedicellis sub fructu crassis (2–3 mm. diametro) ad 4 cm. longis, cicatricibus persistentibus infra medium, sepalis persistentibus; fructibus oblongo-ellipsoideis maturitate ad 5 cm. longis et 3 cm. latis et crassis, leviter inaequilateralibus, dorso basim versus affixis, ventre stigmatum carina ornatis, pericarpio coriaceo demum ad 2 mm. crasso; endocarpio inter semina carinato et appendiculas ceriferas irregulariter lobatas 2–3 mm. longas basi seminum vel funiculorum subpersistentes saepe gerente; seminibus obovoideis, 8–11 mm. longis, 5–8 mm. latis, valde complanatis, grosse scrobiculatis, basi obtusis vel breviter stipitatis, apice rotundatis.

FIJI. VITI LEVU: Tholo North: Nauwanga, vicinity of Nandarivatu, alt. 750 m., *Degener 14537* (TYPE, Arn. Arb.), Feb. 24, 1941 (tree, in forest). VANUA LEVU: Mbu a: Lower Wainunu River valley, alt. 0–200 m., *Smith 1754* (Gray Herb., N. Y. Bot. Gard., etc.), May 7, 1934 (tree 14 m. high, in open forest; native name: *yarangele*).

The type collection bears flowers and a single detached immature fruit, while *Smith 1754* bears mature fruits. In foliage the two specimens show slight differences, which appear to us of an individual nature.

STEM. In *Degeneria* the primary vascular cylinder is a much dissected dictyostele, being composed of numerous discrete bundles that are separated by conspicuous gaps. Each bundle is capped externally by slender thick-walled fibers and is subtended internally by slender, vertically elongated strands of parenchyma. The bulk of the pith is composed of large, relatively thin-walled medullary cells, but transversely oriented plates or diaphragms of stone cells are formed, particularly at the nodal and subnodal levels of the stem. Large spherical oil cells and irregular, often branched sclereids are conspicuous features of the cortex.

In the secondary xylem of the young stem, narrow multiseriate rays extend outward from the gaps in the dictyostele. These rays flare outward through the secondary phloem (*fig. 24*), which is stratified into alternating strands of hard and soft bast. The thin-walled, angular vessels (*fig. 25*) of the secondary xylem occur singly or in small, usually radially oriented clusters. The vessel-members have numerous scalariform perforations and the pitting between vessels, and between vessels and parenchymatous elements, is typically scalariform. The thin-walled imperforate tracheary cells have

pits with minute borders. The parenchyma distribution is dominantly banded apotracheal with a low percentage of scanty paratracheal. The multiseriate rays in the later-formed secondary xylem (*fig. 26*) are of typically fusiform outline as seen in tangential longitudinal sections. The infrequently occurring uniseriate rays are low and are composed of upright cells, such as are present on the margins of the multiseriate rays. Oil cells are of sporadic occurrence in the rays of the secondary xylem. In the stem, the periderm develops in a superficial position.

Each of the salient structural features enumerated in the two preceding paragraphs occurs in the Magnoliaceae, and similar combinations of these structural characters are formed in tropical representatives of that family. In fact, the similarities are so close that it is difficult to differentiate the stems of the two families without a detailed study of their nodal anatomy. On the contrary, the stems of *Himantandra*, although of the same general structural type as in *Degeneria* and the Magnoliaceae, may be differentiated by the occurrence of alternate multiseriate pitting in the vessels of the secondary xylem and by a less conspicuous stratification of the phloem into alternating strands of hard and soft bast.

LEAF AND NODAL ANATOMY. In *Degeneria* five traces enter the base of the petiole, leaving five gaps in the cauline vascular cylinder, i.e. the plant has a penta-lacunar node. The traces divide in their outward course, forming numerous vascular bundles that become oriented into a cylindrical foliar stele. This medullated foliar stele (*fig. 27*), which tends to have a more or less flattened adaxial surface, extends through the petiole and the midrib of the leaf.

The vascularization of the leaf exhibits fundamental similarities to that which occurs in *Himantandra* and the Magnoliaceae, but differs markedly from that which characterizes the Winteraceae, Eupomatiaceae, Annonaceae, Schizandraceae, etc. In *Degeneria*, as in *Himantandra* and the Magnoliaceae, the vascular bundles that branch outward from the median trace are segregated into two groupings on opposite sides of the foliar vascular cylinder. In other words, one or more of them retain a normal orientation of xylem and phloem and form part of the abaxial surface of the foliar stele, whereas the remaining ones develop an inverted orientation of xylem and phloem and form part of the adaxial surface of the foliar vascular cylinder.

Himantandra is characterized by having a tri-lacunar node instead of a penta-lacunar one as *Degeneria*. Although the number of traces that pass outward into the petiole of the Magnoliaceae fluctuates from three to five to many, the nodes of these plants may be distinguished from those of *Himantandra* and *Degeneria* by the fact that they have an additional trace which is concerned primarily in the vascularization of the stipules. This trace occurs on the opposite side of the cauline stele from the median trace of the leaf.

The leaves of *Degeneria*, like those of *Himantandra*, have no stipules, but the leaf-blades of the former genus resemble those of the Magnoliaceae in having stomata with conspicuous subsidiary cells oriented parallel to the

guard cells, numerous large spherical oil cells, etc. The leaves of *Himantandra* are characterized by having their stomata arranged in circles under each of the peltate scales which cover the lower surface of the lamina.

FLOWERS. Solitary supra-axillary flowers characterize *Degeneria*. In the Magnoliaceae the only genera with axillary bisexual flowers are *Elmerrillia* Dandy and *Michelia* L., and here solitary flowers are unusual. The axillary flowers of *Himantandra* are sometimes solitary. The fact that the pedicels of *Degeneria* are bracteate near the middle may indicate that the inflorescence is reduced from a more complex structure and that the supposed pedicel is partially peduncular in origin.

The floral axis of *Degeneria*, unlike that of most Magnoliaceae, is short (*fig. 4*), and the solitary indehiscent carpel is attached in a depression on the apex of the torus (*fig. 28*); this annular apex of the torus is formed at least in part by the fused bases of the stamens and staminodes. A similar apical depression of the torus occurs in *Himantandra*. The vascularization of the floral axis of *Degeneria* and *Himantandra* is of a type commonly encountered in dicotyledons. On the contrary, that of the Magnoliaceae is characterized by its complexity. In addition to a normal dictyostele, the floral axis commonly exhibits a system of anastomosing and dichotomizing cortical bundles. The median vein of the sporophylls is attached to the inner dictyostele, whereas the lateral veins frequently connect with the outer cortical vascular cylinder.

The floral envelope of *Degeneria* is clearly differentiated at maturity into calyx and corolla, but, although the petals differ from the sepals in size and form (*fig. 3*), they resemble them in texture and in their internal cellular composition. In the Magnoliaceae the sepals and petals are usually sub-similar, all of the tepals commonly having a more typically petaloid form, texture, and internal structure. Most early descriptions of the perianth-arrangement in *Himantandra* mention the calyx as composed of two closed calyptrate sepals, one within the other. Diels (in Bot. Jahrb. **55**: 126. 1917) describes these organs as calyptriform bracts and states that sepals and petals are lacking. As the flower of *Himantandra* matures, first one and then the other of these calyptriform organs is lost, leaving closely approximated circular scars at the base of the floral axis. In this connection, however, it should be noted that serial transverse sections of young flower-buds suggest that the calyptriform organs are not single modified appendages, but rather represent fused parts of a perianth. Their internal cellular structure closely resembles that of the sepals and petals of *Degeneria*. Therefore it seems likely that they should be interpreted as a calyptra of fused petals enclosed within a calyptra of fused sepals, just as the single calyptra of *Eupomatia* is regarded as having arisen from fused parts of a perianth.

STAMENS AND STAMINODES. The stamens of *Degeneria* are not differentiated into filament, anther, and connective, and are best described as broad micro-sporophylls (*figs. 15 and 18*) having four slender elongated sporangia that are immersed beneath the abaxial surface of the sporophyll. The

stamens have a conspicuous median vein that dichotomizes at its apex and two lateral veins situated near the margins of the sporophyll (*fig. 15*). The paired sporangia are not located in close relationship to either the median or the lateral veins and thus are not in direct contact with vascular tissue. The staminodes, formed at a higher level of the floral axis, are hooded and have three parallel veins (*fig. 17*). Occasionally one of these hooded organs bears rudimentary micro-sporophylls (*fig. 16*).

The stamens of *Himantandra* are of a fundamentally similar morphological type, but they are much longer and have shorter basally disposed sporangia. Three veins enter the base of the stamens and staminodes, as in *Degeneria*, but the lateral veins frequently do not extend beyond the lower third of the micro-sporophylls. The veins of unusually large stamens may form short lateral veinlets, but these vascular branches are not oriented in relation to the sporangia. In *Himantandra* staminodes occur both below and above the fertile micro-sporophylls.

Although the stamens of the Magnoliaceae differ markedly in having large, protuberant, usually marginally placed pairs of elongated sporangia, they are characterized by having a similar type of vascularization. Many representatives of the family, in addition to a conspicuous median vein, exhibit two lateral veins at the base of the stamen which extend outward for varying distances. Here again, neither the lateral veins nor their branches are related in distribution to the sporangia. In certain of the Magnoliaceae, e. g. species of *Michelia*, the lateral veins are much reduced or are entirely eliminated.

POLLEN. The pollen grains of *Degeneria* are broadly ellipsoid in form, 45 to 55 μ long and 37 to 42 μ broad, their dimensions fluctuating considerably during varying degrees of re-expansion of the grains. They are typically of the so-called monocolpate type, having a single narrow furrow (*fig. 12*), which broadens markedly at both poles of the grain. The outer exine is smooth except in the region of the furrow, where it is finely and irregularly pitted. During the later stages of the re-expansion of the pollen grains, this layer tends to split in the broader polar parts of the furrow and thus to allow the contents of the grain to bulge outward. In pollen that has been re-expanded by a brief treatment in dilute NaOH, the furrow of the outer exine is subtended by a broad band of much swollen, finely and uniformly pitted material (*figs. 13 and 14*). This porous layer dissolves along with the contents of the grain during more prolonged treatments with NaOH, leaving the outer exine as the only residue.

Monocolpate pollen grains of similar size and form, having similar polar extensions of the furrow, occur in various representatives of the Magnoliaceae. Our colleague, Dr. A. O. Dahl, has demonstrated experimentally that even in the pollen grains of *Magnolia stellata* (Sieb. & Zucc.) Maxim., *M. denudata* Desr., and *M. salicifolia* (Sieb. & Zucc.) Maxim. the pollen tubes frequently emerge at the poles, rather than at the sides, of the grains. The pollen grains of *Himantandra* are smaller and of more nearly spherical form. They have a thin, smooth outer surface, but are provided with a single furrow and thus are also of the monocolpate type.

CARPEL. *Degeneria* is characterized by having a single indehiscent carpel (figs. 4, 30). In *Himantandra* the carpels are several, usually more or less coherent at the base, at length concrescent and indehiscent. The Magnoliaceae usually have numerous carpels, which frequently are coherent at the base; the carpels commonly are dehiscent, but in some cases are indehiscent and then concrescent. Reduction in the number of carpels is infrequent in the Magnoliaceae, but in certain cases, such as *Pachylarnax* Dandy, these organs may be reduced to two. It should be noted in this connection that reduction to a single carpel occurs in several species of the Winteraceae.

The carpel of *Degeneria*, preceding and during anthesis, resembles an adaxially folded, 3-veined sporophyll (fig. 22), in which the lateral veins, the narrow linear placentas, and the two rows of numerous ovules are quite remote from the margins of the macro-sporophyll. Furthermore, the margins of the carpel are not infolded or coherent during ontogeny, but tend to flare apart externally (figs. 22 and 23). The placentation is clearly laminar and adaxial. At anthesis, broad areas (between the margins and the placentas) of the adaxial surface of the macro-sporophyll are closely approximated, but are not actually coherent except in the basal part of the carpel. The epidermal layers of the two adjacent adaxial surfaces are separated by numerous, loosely interlocking, short, glandular hairs. Thus the stigmatic areas of the carpel of *Degeneria* are not localized externally upon the recurved margin of the sporophyll, but extend inward along the adaxial surfaces of the carpel into close proximity to the placentas. During the development of the fruit, the contiguous adaxial surfaces of the carpel become concrescent, the outwardly recurved margins of the sporophyll persisting as parallel corky ridges. The ovules of *Degeneria* are of the anatropous type illustrated in figs. 20 and 21. The vascular bundle of the ovule is conspicuously coiled in its course through the funicle.

FRUIT. The mature fruit of *Degeneria* is inequilaterally oblong-ellipsoid, marked on the ventral side by the elongated stigmatic ridges described above. The coriaceous pericarp is smooth without, while the endocarp is irregularly ridged, possibly due to the pressure of the developing seeds (although even when the seeds are abortive, these ridges are discernible). In addition to these subcoriaceous ridges, the endocarp bears small irregular waxy appendages, these being especially apparent in the placental regions. Often these appendages appear somewhat cupuliform about the bases of seeds, with which they are frequently detached (fig. 11); however, the appendages have no attachment to the seeds and are strictly endocarpic in origin. Having no fresh fruits to study, we cannot be sure of the significance of these appendages nor of the inner consistency of the fruit.

The seeds are in two rows and the attachment is still apparent in nearly mature fruits (fig. 10). Those of one row are strictly sessile, while those of the other row are borne on slender elongated funicles. Apparently there is a substantial proportion of sterility in the seeds of *Degeneria* (as not infrequently in the Magnoliaceae and related groups), for none of our seeds

contain embryos. Attempts to germinate some of them, in order to obtain a chromosome count, having failed, we dissected others and failed to find any embryos or any endosperm which could be interpreted. The external coarse reticulation of the seeds is characteristic. The single fruit accompanying the type collection is not quite mature but bears a full complement of seeds (*fig. 10*). The fruits of the Smith specimen (*fig. 2*), however, although essentially similar externally, have only a few seeds developed (and these sterile), the majority of the ovules being atrophied and dried upon the walls of the large cavity.

The fruits of the Himantandraceae and Magnoliaceae are so different from those of *Degeneria* as to make comparison unnecessary for the time being. However, the presence of a slender elongated funicle in *Degeneria* and in many Magnoliaceae is noteworthy; such a funicle is not found in *Himantandra*. Superficially, the fruit of *Degeneria* suggests that of certain species of Winteraceae, although these as a rule are much smaller. However, an undescribed New Guinea species of *Bubbia* v. Tiegh. has a large fruit remarkably similar to that of *Degeneria*, differing, however, in its small several-seriate seeds without funicles and in various other details.

CONCLUSIONS. The various families of the ranalian complex exhibit similarities and differences in their vegetative and floral organs that are indicative of reticulate rather than linear relationships. Certain of the morphological similarities may be, and probably are, due to parallel specialization from a common ancestry, whereas others represent retentions of structures that characterized the primitive ranalian stock. Therefore, in discussing the relationships of the various families of the Ranales, it is essential to consider and carefully to weigh evidence from *all* organs and parts of the plants.

The salient morphological features of the vegetative organs of *Degeneria* closely resemble those of the Magnoliaceae, plants of the latter family differing chiefly in the presence of stipules and a correspondingly more complex type of vascularization of the leaf. The absence of stipules in *Degeneria*, in itself, is not sufficient grounds for excluding the genus from the Magnoliaceae, particularly as the petioles are provided with marginal expansions (*fig. 29*) that envelop the "growing point" during early stages of their ontogeny. The successively formed leaves of magnoliaceous seedlings not infrequently exhibit transitions between such foliar structures and leaves with conspicuous stipules. At the same time, the vascularization of the seedling leaves becomes increasingly complex. Thus, the chief justifications for excluding *Degeneria* from the Magnoliaceae are to be found in its reproductive rather than in its vegetative organs. Here the morphological differences are numerous and extensive, significant similarities occurring, however, particularly in the pollen and in the vascularization of the stamens.

Although the flowers of *Degeneria* resemble those of *Himantandra* in their remarkable stamens, in their compressed floral axes, and in the presence of numerous staminodes, the morphology of the carpels and the

calyptriform perianth-parts of the latter genus present serious obstacles to the inclusion of *Degeneria* in the Himantandraceae. Furthermore, although the vascularization of the stem and leaf is of a fundamentally similar type in *Degeneria* and *Himantandra*, the xylem and phloem of *Degeneria* are indicative of a closer structural relationship to the Magnoliaceae than to the Himantandraceae. Of course, the peculiar distribution of the stomata and the peltate scales of *Himantandra* have no counterparts in either the Degeneriaceae or Magnoliaceae.

The reproductive organs of *Degeneria* exhibit similarities to those of certain representatives of the Winteraceae (exclusive of *Illicium*). Such similarities occur at times in the form and texture of the perianth, in the reduction of the carpels to one, in the morphology of the carpel, in the formation of numerous ovules, and in the gross appearance of the fruit. However, the stamens—as regards both their form and their vascularization—are of a fundamentally different type throughout the Winteraceae. The pollen grains differ profoundly in their salient morphological features and no staminodes are formed in the Winteraceae. In addition, the internal structure of the vegetative organs of *Drimys* and its segregates is entirely unlike that of *Degeneria*. The vascularization of the leaf is of a fundamentally different type, and the structure of the vesselless xylem and of the phloem is indicative of a rather remote relationship of the Winteraceae to the Degeneriaceae, Himantandraceae, and Magnoliaceae.

In conclusion, it should be emphasized that extensive comparative investigations of the stamens and carpels of the Ranales are needed, since the remarkable sporophylls of *Degeneria* may afford clues for visualizing diverse trends of morphological specialization in these organs.

In the following analyses we point out the salient features of the Degeneriaceae and its closest allies:

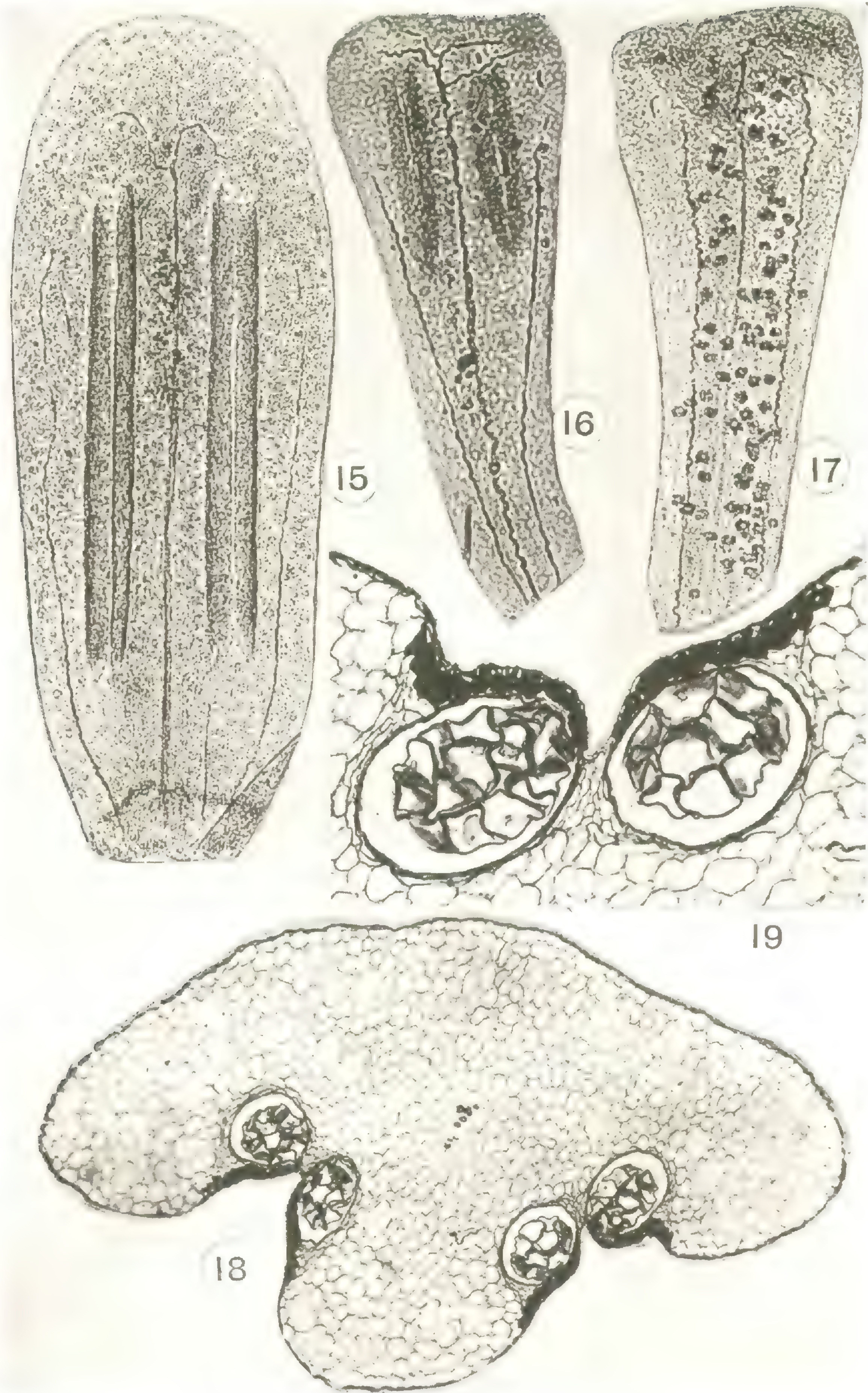
Stipules none; sepals much smaller than petals and very distinct from them; floral axis short, broader than long, depressed at apex; anthers dehiscing extrorsely, the pollen-sacs not protuberant; staminodes present within the stamens, cucullate; carpel solitary, open along the ventral suture when young; ovules numerous (24-26); carpel indehiscent, the seeds biseriate, those of one series sessile, of the other series conspicuously funiculate.....Degeneriaceae.

Stipules present; sepals usually subsimilar to petals; floral axis usually elongated; anthers dehiscing introrsely or laterally (extrorsely in *Liriodendron*), the pollen-sacs protuberant; staminodes none; carpels numerous, very rarely as few as 2 (in *Pachylarnax*), never solitary, closed along the ventral suture; ovules few or several, seldom more than 10; carpels usually dehiscent, concrescent if indehiscent; funicle often elongate.....Magnoliaceae.

Stipules none; copious peltate scales present on branchlets, lower leaf-surfaces, and inflorescence-parts; perianth composed of a calyptra of fused petals within a calyptra of fused sepals; floral axis short, depressed at apex; anthers dehiscing extrorsely, the pollen-sacs not protuberant; staminodes present both without and within the stamens, not cucullate; carpels several, closed along the ventral suture; ovules 1 or 2; fruit composed of coalesced carpels; funicle not elongate..... Himantandraceae.



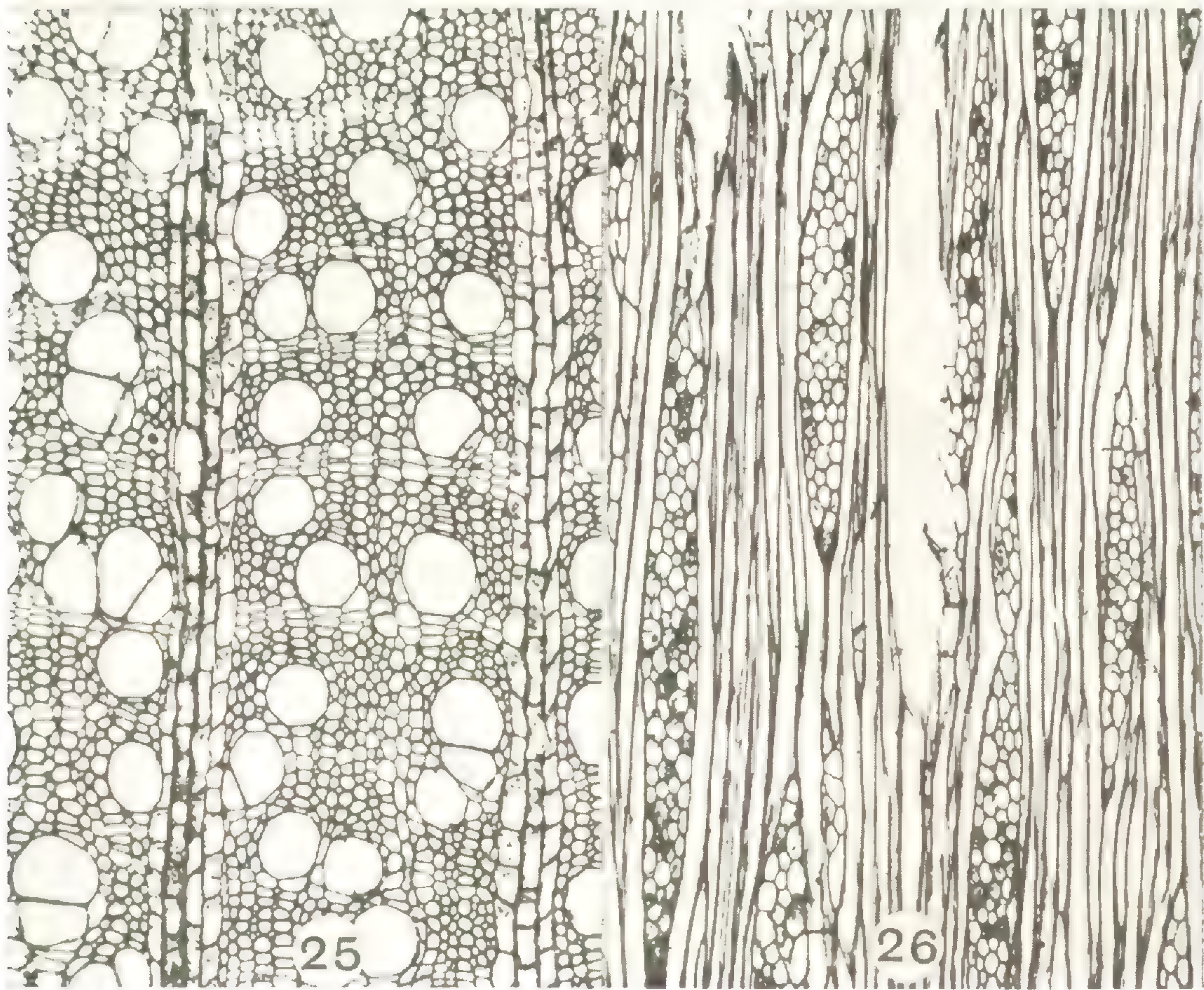
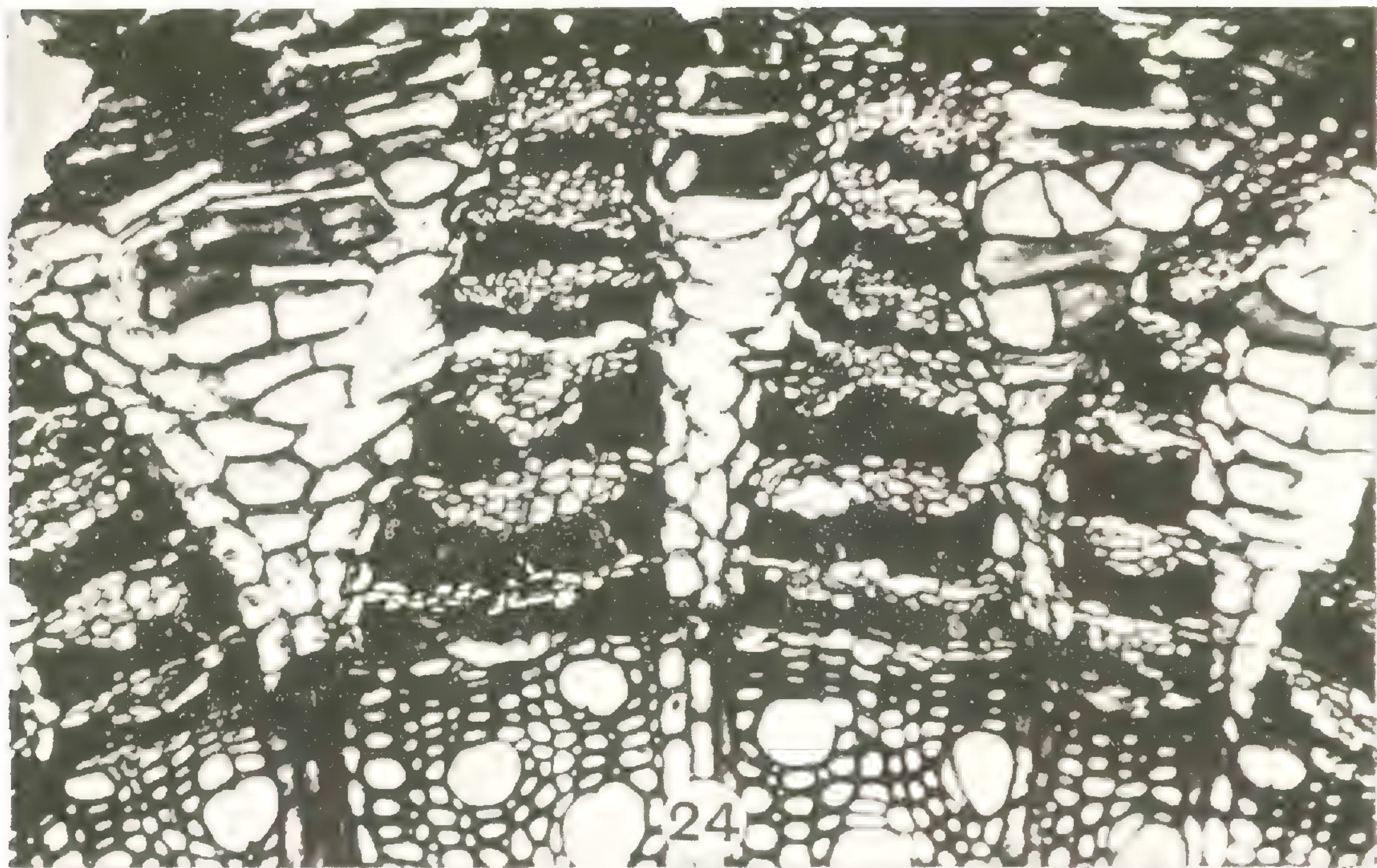
DEGENERIA VITIENSIS Bailey and Smith



DEGENERIA VITIENSIS Bailey and Smith



DEGENERIA VITIENSIS Bailey and Smith



DEGENERIA VITIENSIS Bailey and Smith



DEGENERIA VITIENSIS Bailey and Smith

Stipules none; sepals often much smaller than petals, sometimes (in *Drimys*) calyptri-form; floral axis short, not depressed at apex; anthers dehiscing apically, subapically, or laterally, the pollen-sacs protuberant; staminodes none; carpels many to few, sometimes solitary, closed along the ventral or apical stigmatic suture; ovules few to many; carpels indehiscent, the seeds without elongated funicles..... Winteraceae.

EXPLANATION OF PLATES

All plates illustrate *Degeneria vitiensis* I. W. Bailey and A. C. Smith. All figures are drawn or photographed from *Degener 14537* except figs. 2, 25, and 26, which are from *Smith 1754*.

PLATE I

Fig. 1. Flowering branchlet, $\times \frac{1}{2}$; 2. Fruiting branchlet, $\times \frac{1}{2}$; 3. Flower at anthesis, $\times 1$; 4. Floral axis, with petals, stamens, and staminodes removed, slightly after anthesis, $\times 2$; 5. Side view of carpel, slightly after anthesis, $\times 4$; 6. Longitudinal section of carpel, $\times 4$; 7. Petal, inner surface, $\times 2$; 8. Stamens, extrorse and lateral views, $\times 2$; 9. Staminodes, introrse and lateral views, $\times 2$; 10. Fruit, nearly mature, with a portion of wall removed to show seeds, funicles, and ridges and appendages of the endocarp, $\times 1$; 11. Seed and portion of the endocarpic appendages, $\times 3$; 12. Pollen grain re-expanded and mounted in lactic acid, $\times 300$; 13. Pollen grain after brief treatment in NaOH, mounted in lactic acid, $\times 300$; 14. Pollen grain after similar treatment, optical section, $\times 300$.

PLATE II

Fig. 15. Stamen re-expanded and cleared in dilute NaOH, showing sporangia and median and lateral veins, $\times 24$; 16. Hooded staminode with rudimentary sporangia, $\times 24$; 17. Hooded, 3-veined, typical staminode, $\times 24$; 18. Transverse section of re-expanded and cleared stamen, showing four sporangia and four short arcs of endothecium, $\times 107$; 19. Part of fig. 18 more highly magnified, $\times 260$.

PLATE III

Fig. 20. Transverse section of carpel just after anthesis, showing ovules, $\times 31$; 21. Sagittal section of ovule, $\times 260$; 22. Transverse section of young carpel at level of locule, $\times 31$; 23. Transverse section of young carpel above level of locule, $\times 64$.

PLATE IV

Fig. 24. Transverse section of young secondary phloem, showing flaring rays and strands of hard and soft bast, $\times 107$; 25. Transverse section of mature secondary xylem, $\times 50$; 26. Tangential longitudinal section of mature secondary xylem, $\times 50$.

PLATE V

Fig. 27. Transverse section of petiole, showing foliar vascular cylinder, $\times 27$; 28. Transverse section at base of flower-bud, showing carpel in apical depression and surrounded by ring-shaped crown of torus, $\times 8$; 29. Transverse section at apex of vegetative shoot, showing clasping bases of young leaves, $\times 39$; 30. Transverse section of flower bud, showing petals, stamens, staminodes and carpel, $\times 8$.

BIOLOGICAL LABORATORIES AND ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

A NOMENCLATURAL NOTE ON THE HIMANTANDRACEAE

A. C. SMITH

THE family Himantandraceae, proposed by Diels in 1917, is now generally accepted by botanists as a distinct family of the order Ranales, related to the Magnoliaceae. However, there has been disagreement as to the correct name for its single genus, whether *Himantandra* F. v. Muell. or *Galbulimima* F. M. Bailey. In an effort to decide which of these names to use, the literature referring to the group has been searched as thoroughly as possible.

The first mention of a plant referable to the family was in 1887, when F. v. Mueller (in Austral. Jour. Pharm. **2**: 4; in Bot. Centralbl. **30**: 325) described the species *Eupomatia Belgraveana*, based on *Forbes* 759 from New Guinea. The description of the species is adequate, but the only mention of the name *Himantandra* occurs in the remark that “. . . this *Eupomatia* might subgenerically or perhaps even generically be separated (as *Himantandra*) . . .” A statement of Mueller’s that “. . . a description has been prepared for the 9th part of the ‘Papuan Plants’ ” gives a clue to the next mention of the species.

Such mention (F. v. Muell. Pap. Pl. **2**: 54. 1890) has apparently been overlooked by subsequent students. Although no description is given, Mueller lists the plant as *Himantandra Belgraveana* and refers to the original place of description of *Eupomatia Belgraveana*, thus expressing his definite opinion that the species is generically distinct from *Eupomatia*.

In 1894 F. M. Bailey (in Queensl. Dept. Agr. Bot. Bull. **9**: 5. 1894) described *Galbulimima* as a new genus, placing it in the family Magnoliaceae, tribe Winterae; a single species, *G. baccata*, based on a specimen from Queensland, was proposed. Both genus and species are adequately described.

In 1912 Diels (in Bot. Jahrb. **49**: 164) presented the first formal description of the genus *Himantandra*, proposing the binomial *H. Belgraveana* (F. v. Muell.) Diels under the impression that this was a new combination. In 1917 Diels (in Bot. Jahrb. **55**: 126–134) proposed the family Himantandraceae, discussing it in detail and making the new combination *H. baccata* (F. M. Bailey) Diels.

In 1915 Sprague (in Hook. Ic. Pl. **31**: pl. 3001) had redescribed Bailey’s genus and species (*Galbulimima baccata*), placing the genus in the family Magnoliaceae, tribe Illicieae. In 1922 (in Jour. Bot. **60**: 137) he pointed out that *Himantandra* had not been proposed as a genus by Mueller in 1887. In this it appears that Sprague is correct and that Mueller’s original mention of the genus was as a *nomen provisorium* and did not constitute

valid publication. This conclusion is the opposite of that reached by Diels in 1917.

Neither Diels nor Sprague mentions Mueller's publication of 1890, which appears to validate the name *Himantandra* beyond question and in advance of Bailey's publication of *Galbulimima*. Although Mueller, in 1890, published the combination *Himantandra Belgraveana* without indicating it as the basis of a new monotypic genus, this implication is obvious in his reference to the original place of publication of *Eupomatia Belgraveana*. Thus Mueller has given a reference to an adequate description which may be taken as a *descriptio generico-specifica* and has validated the generic name *Himantandra* (see Internat. Rules of Bot. Nomenclature ed. 3. Art. 43. 1935).

It appears that E. G. Baker and Norman (in Jour. Bot. **61**: Suppl. 2. 1923) did not accept Sprague's interpretation, for they proposed two new species in the genus *Himantandra*. Sprague (in Jour. Bot. **61**: 200. 1923) promptly reiterated his opinion and transferred the two recent new species to *Galbulimima*.

Thus we have a group of four species for which the eight possible binomials have been used. Since 1923 students of the group have used the name *Himantandra*, but none of them has cited Mueller's paper of 1890 in support of his stand. Without considering this paper, Sprague's interpretation would seem to be correct and the name *Galbulimima* would have to be used, but since this paper exists I conclude that we may definitely accept 1890 as the date of authentic publication of the generic name *Himantandra*.

Following is the synonymy of the group and citation of all the references which I have been able to locate. Whether or not all the species will prove acceptable cannot be stated at present.

HIMANTANDRACEAE Diels in Bot. Jahrb. **55**: 126. 1917; Hutchinson in Kew Bull. **1921**: 186. 1921, Fam. Fl. Pl. Dicot. 84. 1926.

Himantandra F. v. Muell. in Austral. Jour. Pharm. **2**: 4, *nomen provisorium*. 1887, in Bot. Centralbl. **30**: 326, *nomen provisorium*. 1887, Pap. Pl. **2**: 54. 1890; Diels in Bot. Jahrb. **49**: 164, as *Himatandra*. 1912, in Bot. Jahrb. **55**: 127. 1917.

Galbulimima F. M. Bailey in Queensl. Dept. Agr. Bot. Bull. **9**: 5. 1894, Queensl. Fl. **1**: 19. 1899; Sprague in Hook. Ic. Pl. **31**: pl. 3001. 1915, in Jour. Bot. **60**: 137. 1922, in Jour. Bot. **61**: 200. 1923.

1. **Himantandra Belgraveana** (F. v. Muell.) F. v. Muell. Pap. Pl. **2**: 54. 1890; Diels in Bot. Jahrb. **49**: 165. f. 6, as *Himatandra B.* 1912; Hall. f. in Arch. Néerl. Sci. Exact. Nat. IIIB. **1**: 188. 1912; Diels in Bot. Jahrb. **52**: 186. 1915, in Bot. Jahrb. **55**: 127. f. 1. 1917; Bak. f. & Norman in Jour. Bot. **61**: Suppl. 3. 1923; Lane-Poole, Rep. For. Res. Papua 86. 1925; Hutchinson, Fam. Fl. Pl. Dicot. f. 4. 1926; White & Francis in Proc. Roy. Soc. Queensl. **39**: 62. 1928.

Eupomatia Belgraveana F. v. Muell. in Austral. Jour. Pharm. **2**: 4. 1887, in Bot. Centralbl. **30**: 325. 1887.

Galbulimima Belgraveana Sprague in Jour. Bot. **60**: 138. 1922.

2. **Himantandra baccata** (F. M. Bailey) Diels in Bot. Jahrb. **55**: 128. 1917.

Galbulimima baccata F. M. Bailey in Queensl. Dept. Agr. Bot. Bull. **9**: 5. 1894, Queensl. Fl. **1**: 19. 1899, Compr. Cat. Queensl. Pl. 25. *f.* 8. 1913; Sprague in Hook. Ic. Pl. **31**: *pl.* 3001. 1915, in Jour. Bot. **60**: 138. 1922; Domin in Bibl. Bot. **22** [Heft 89]: 115. 1925.

3. **Himantandra nitida** Bak. f. & Norman in Jour. Bot. **61**: Suppl. 2. 1923.

Galbulimima nitida Sprague in Jour. Bot. **61**: 200. 1923.

4. **Himantandra parvifolia** Bak. f. & Norman in Jour. Bot. **61**: Suppl. 2. 1923.

Galbulimima parvifolia Sprague in Jour. Bot. **61**: 200. 1923.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

NEW SPECIES OF CROTON L. FROM NEW GUINEA

LEON CROIZAT

THIS is the first of a proposed series of papers on the Euphorbiaceae of New Guinea prepared in connection with a study of various other Malaysian species of *Croton*. The paper is based essentially on material collected by Mr. L. J. Brass, botanist on the three expeditions to New Guinea under the sponsorship and leadership of Mr. Richard Archbold of New York. References are included to other collections from New Guinea and neighboring islands that have been assembled at the Arnold Arboretum in recent years. All specimens are deposited in the herbarium of the Arnold Arboretum of Harvard University.

***Croton morobensis* sp. nov.**

Arbor ad 15 m. alta. Innovationibus inflorescentiisque stellato-tomentosis citius glabrescentibus, indumento sordide ochraceo. Foliis ovatis vel elliptico-ovatis, apice breviter acuminatis basi rotundatis, 20–10 cm. longis, 10–7.5 cm. latis, in sicco brunneis, supra nitidis vel subnitidis, subtus indumento stellato persistente dissite tomentellis, margine repando-serratis, dentibus plus minusve glandulosis fere alterna vice majoribus minoribusque ad 3 per 1 cm. longitudinis; nervis primariis utrinque ca. 10-jugis, gracilibus, anastomosantibus valde obscuris; petiolo 1.5–5 cm. longo, sordide tomentoso, apice glandulis 2 posticis patelliformibus sessilibus ornato. Inflorescentia spicata, simplici, [videtur] 2-sexuali. Floribus ♂ haud visis. Floribus ♀ fructu delapso tantum lustratis: perianthio ad 5 mm. lato, pedicello ad 2–3 mm. longo, extus tomentello vel glabrato, lobis integerrimis, late triangularibus, ca. 2 mm. longis, petalis videtur nullis, disci glandulis 5 sat validis discretis; columella gracili, 4–5 mm. longa; coccis maturis levioribus, indumento stellato dissito, ad 8 mm. longis; semine ambitu fere tetragono, i.e., costis omnibus dorsali praesertim validis, obscure grosseque ruguloso brunneo, caruncula minima elongata cum hilo contigua, ca. 4–5 mm. longo, 4 mm. lato.

NORTHEASTERN NEW GUINEA: Morobe District, Lae, *M. S. Clemens* 10464.

I cannot place this new species. It is certainly not related with the group of *C. Verreauxii* Baill. (Sect. *Gymnocroton* Baill.) and very doubtfully with that of *C. argyratus* Blume. It might not be too far from *C. Wassi-Kussae* Croiz. but the material now available is inadequate for a systematic disposition.

***Croton Brassii* sp. nov.**

Arbuscula ad 6 m. alta. Innovationibus inflorescentiisque indumento crustaceo-lepidoto pallide aureis, serius glabratis. Foliis ellipticis, fere utrinque aequo jure acuminatis, apice interdum mucronatis, 8–4 cm. longis, 3–1.75 cm. latis, firme chartaceis, supra nigro-olivaceis vel brunneis, subtus indumento continuo discolori-aureis, margine integris, costa supra profun-

dius canaliculata subtus prominula, nervis obscuris utrinque ca. 6-jugis, jugo majore sub apice anastomosato saepe jugum minorem vel nervum solitarium amplexente, quapropter nervis totis in latere laminae quolibet ad 12–15, supra haud perspicuis; petiolo canaliculato, pallide aurato, 1–2.5 cm. longo, apice glandulis 2 subsessilibus anticis in laminae origine obsito. Inflorescentiis spicatis, 1- vel 2-sexualibus. Floribus ♂ : alabastro ca. 3 mm. magno, pedicello ca. 4–5 mm. longo, lobis triangulari-ovatis, 2.5 mm. longis, 1.5 mm. latis, petalis ovato-quadrangularibus ca. 2 mm. magnis, staminibus ca. 15, basi pilosis, extus serie staminodiorum circumdatis. Floribus ♀ : perianthio longius cyathiformi ca. 5–6 mm. longo, 5 mm. lato, lobis 5 triangularibus, 4 mm. longis, 1.75–2.5 mm. latis, acutis, erectis, apice subcallosis, basi extus per costulas in perianthium confluentibus, petalis quam lobis majoribus, late ovatis, 3.5 mm. longis 3 mm. latis, hic inde pilis stellatis obsitis, glandulis 5 sat magnis; ovario toto lepidoto, indumento secedibili, ad 3 mm. magno, stylis 3 ad basim liberis, quove in basim obtriangularem [2 mm. longam, 1.5 mm. latam] dilatatum dein in 3 lobis digitatis ad 2.5–3 mm. longis partito.

NETHERLANDS NEW GUINEA: 15 km SW. of Bernhard Camp, Idenburg River. *Brass* 12061, January 1939, frequent in secondary mossy forest at 1800 m. slender tree 6 m. high.

A strong species suggesting in its gross morphology two very critical species, *C. metallicus* Seem., of the Fiji Islands, and *C. insularis* Baill. of New Caledonia and Eastern Australia, but altogether unlike them in floral characters.

***Croton Luciae* sp. nov.**

Arbor ad 21 m. alta. Innovationibus inflorescentiisque pube hispidula stellato-tomentosa velutinosus vel subpannosis, olivaceis vel sordide ochraceis, trichomatibus sub lente nempe glandulis commixtis [an revera succo indurato nigricante e hydatodiis minimis effuso?]. Foliis ambitu valde ludentibus, vulgo ellipticis, apice basique plus minusve acutatis vel cuneatis, interdum obovatis, basi truncatis, 15–8 cm. longis, 10–3 cm. latis, firme chartaceis vel subcoriaceis, supra brunneis, valde opacis, trichomatibus minutis persistentibus valde dissitis subruvidis, subtus indumento eadem ratione at confertiore sordide ochraceis tomentosis, nervis primariis patentibus, apice dichotomis, vix anastomosatis, ca. 8–10-jugis, supra gracillimis subtus plus minusve manifestis, margine primo intuitu integro sub lente repandulo-serrato, serraturis glandulosis; petiolo herbaceo canaliculato tomentoso, 2–9 cm. longo, apice glandulis 2 posticis crateriformibus stipitatis vel subsessilibus ornato. Inflorescentia spicata 1- vel 2-sexuali ad 20–25 cm. longa, sat valida. Floribus ♂ : perianthio ca. 8 mm. lato, 7 mm. longo, lobis grosse lepidoto-stellatis, extus ad basim hirtellis, 2 mm. longis, 3 mm. latis; petalis ovatis 3.5 mm. longis, ca. 3 mm. latis; staminibus ca. 15, [videtur] cum staminodiis commixtis, filamento ca. 3 mm. longo, basi incrassato lanuloso. Floribus ♀ : perianthio ca. 10–12 mm. lato, 5–6 mm. longo, pedicello sat valido ca. 5–7 mm. longo, lobis triangulari-ovatis, cucullatis, ca. 3 mm. longis, totidem latis, basi glandula valida quove insignito, petalis ligulato-setaceis ca. 3 mm. longis ciliatis longius lanulosis; ovario depresso 5 mm. lato, 3 mm. longo, grosse tomentoso, ochraceo, stylis 3 more proprio ut sequitur cruciformibus; styli cujusvis parte basali 1.5 mm. longa integra, apice in ramulos 3-partita, ramulorum lateralium

[scilicet, crucis brachiorum] quove 1.5 mm. longo, ramulo apicali [scilicet, crucis capite] 2.5 mm. longo, ramulis omnibus totisque canaliculatis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. N.E. of Lake Habbema, 2200 m. camp, *Brass & Versteegh 11121*, Nov. 1938, common substage tree of primary forest, 21 m. high, 29 cm. diameter; bark 6 mm. thick, fairly rough, with an odor; wood white; fls. yellow-green; fruit brown.

This outstanding new species has certain affinities with the Australian group of *C. arnhemicus* Muell.-Arg., and with *C. Boutonianus* Muell.-Arg. of the Island of Mauritius. Among the South American species, it somewhat suggests *C. piptocalyx* Muell.-Arg. and *C. celtidifolius* Baillon. This is apparently one of the archetypes of *Croton*, as it represents a biotype with almost complete pantropic distribution. I dedicate this species to my wife, deriving the specific epithet from her Christian name, in acknowledgment of her continuous assistance in my work.

***Croton philombros* sp. nov.**

Arbuscula. Innovationibus inflorescentiisque parcius lepidotis vel glabris. Foliis alternatis, lanceolatis vel elliptico-lanceolatis, apice plus minusve breviter acuminatis, interdum subfalcatis, basi rotundatis, firme chartaceis, in sicco pallide brunneis, vix evolutis parcius lepidotis, adultioribus citissime glabris, margine sub lente repandulo-serrato, nervis primariis delicatis ca. 10-12-jugis, late adscendentibus, gracillime anastomosatis; petiolo gracili 1.5-3.5 cm. longo, parcius tomentello-lepidoto, apice glandulis 2 posticis late patelliformibus subsessilibus ornato. Inflorescentia terminali spicata, 2-sexuali. Floribus ♂: perianthio 4-5 mm. lato, pedicello gracili 3-4 mm. longo, lobis late ovatis, petalis obovato-spathulatis magnitudine lobos aequantibus, ca. 2 mm. longis, 1.5 mm. latis, staminibus ca. 10, 3 mm. longis. Floribus ♀: perianthio ca. 4 mm. longo, 3 mm. lato, pedicello 1.5-2 mm. longo, lobis 5 imbricativis ca. 3.5 mm. longis 1.5 mm. latis, pellucido-punctatis, ramose venosis, basi glandula quove aucto, petalis nullis; ovario globoso, 1.5 mm. magno, albicante, stellato- vel lepidoto-tomentoso, stylis 3 liberis, quove 1.5-2 mm. integro dein 1.5 mm. partito.

BRITISH NEW GUINEA: Western Division, Penzara, between the Morehead and the Wassi Kussa Rivers, *Brass 8455A* (holotype), December 1936, tree 4-6 m., rain-forest along creeks; same locality, *Brass 8440*, December 1936, creek fringing rain forest, compact tree 10 m.

Despite its having smaller ♀ flowers, *Brass 624*, collected in 1925 at Biriatabu, British New Guinea, and described as a compact tree in rain-forest, may also belong here.

Croton philombros is a species of Sect. *Gymnocroton* Baill., typified by *C. Verreauxii* Baill., which is endemic to Australia. Different authors have credited *C. Verreauxii* to various regions of Australasia including New Guinea, but their concept of the limits of Baillon's species is apparently so uncertain that I am not ready to accept their records before critically studying their specimens. Section *Gymnocroton* ranges from India to the Fiji Islands and consists of biotypes which are remarkably uniform in vegetative parts and gross floral morphology. These biotypes can be separated specifically only on the strength of intangibles and sums of minor characters. *Croton philombros* differs from authentic Australian material of *C. Ver-*

reauxii in the characters of the ♀ calyx and in certain intangibles of the foliage. Schumann described two species from New Guinea, *C. choristadenia* [sic] (Nachtr. Fl. Deutsch. Schutzgeb. Südsee 295. 1905) and *C. enantiophyllus* (op. cit., 296), stating that both have opposite leaves but that the latter has stigmas and foliage unlike *C. choristadenia* and 1-sexual inflorescences. It is exceedingly difficult, if at all possible, to form an opinion of Schumann's species from the descriptions, and I am by no means certain that his two binomials actually represent distinct entities. It is unlikely that either species has opposite leaves such as described by Schumann, because a phyllotaxy of this kind is found in *Croton* only as an exception, that is, on shoots on which the foliage is verticillate or subverticillate, suggesting to a casual observer that the leaves may be opposite. Taking Schumann's descriptions at their face-value I suspect that his species belong to Sect. *Gymnocroton*, but I have seen no material from New Guinea that I can refer to either.

***Croton mallotophyllus* sp. nov.**

Arbuscula ad 8 m. alta. Innovationibus inflorescentiisque pube stellata longe hirta primum tomentellis, serius glabratis, pallide ochraceis. Foliis optime ellipticis, apice breviter acuminatis, basi rotundatis subtruncatisve, levissime auriculatis, 23–9 cm. longis, 8–3 cm. latis, tenuiter chartaceis, in sicco utrinque viridibus, margine sub lente crenato-repandulis, crena qualibet glandula aucta, crenis ipsis ad 4 per 1 cm. longitudinis, nervis primariis ca. 10–14-jugis, gracilibus, sat procul a margine anastomosatis, nervo medio validiore, supra glabris, subtus pube minuta dissita tomentellis, petiolo ca. 5 cm. longo, hispido-tomentoso, apice glandulis 2 posticis sessilibus ornato. Inflorescentia simplici, spicata. Floribus ♂ ignotis. Floribus ♀: perianthio hispido tomentello pallide luteo, ca. 3 mm. magno, petalis nullis, lobis 5 late ovatis hyalinis, ad 2 mm. longis, 1–1.25 mm. latis, medio tenuissime nervosis hic inde [videtur] ceraceo-glandulosis, dorso hispido-tomentellis, apice indumento confertiore, glandulis [videtur] in torum continuum cyathiformem sub ovario connatis; ovario ca. 2 mm. magno, rotundato, apice breviter libero, hispidulo, pallide lutescente, stylis 3 fere ad basim partitis, ad 2 mm. longis, quove primum integro, dein ad tertia duo supera partito, taeniato-applanato, epapilloso, nigricante.

NETHERLANDS NEW GUINEA: Nabire, *Kanehira & Hatusima* 11523, November 1940, sea level, in rain-forest, plant 8 m. high.

A strong species, unlike all others that I have so far seen from New Guinea, with a foliage somewhat reminiscent of that of *Mallotus Moritzianus* Muell.-Arg. To all appearances also belongs here *Kanehira & Hatusima* 11443, a sterile specimen collected at the same locality and at the same time as the holotype. *Croton mallotophyllus* is reminiscent of one of my species, *C. Merrillianus*, from Hainan, but this has larger ♀ flowers. It is possible that both belong to the same section.

***Croton pilargyros* sp. nov.**

Arbuscula. Innovationibus inflorescentiisque totis cinereo-tomentellis, sub lente hispidulis, demum glabrescentibus. Foliis late ovatis vel ovatis, apice abrupte acuminatis vel apiculatis, basi rotundatis subpeltatisve, 18–9

cm. longis, 14-6 cm. latis, primum indumento facillime detergibili totis griseo-tomentellis vel floccoso-tomentellis, demum supra glabris, saturate brunneis, subtus griseo-tomentellis, more *C. argyrati* formarum subnitidis revera haud argenteo-lepidotis, margine erosulis, subintegris, nervis primariis ca. 6-8-jugis patentius adscendentibus, primo jugo ramoso, anastomosibus delicatis at conspicuis; petiolo herbaceo, tomentello, 3-10 cm. longo, glandulis posticis 2 sessilibus insignito. Inflorescentia spicata, ad 20 cm. longa, bisexuali. Floribus ♂ glomerulatis: perianthio ca. 5-6 mm. lato, pedicello 6-7 mm. longo, lobis petalisque similibus, ca. 2 mm. longis ac latis, glandula [videtur] basi auctis, staminibus ca. 12, filamentis ca. 4 mm. longis, toro lanuloso. Floribus ♀ [videtur] singulis: perianthio ca. 4 mm. longo, 6-7 mm. lato, pedicello 3 mm. longo, lobis 3 mm. longis, 2 mm. latis, ligulatis, apice rotundatis, intus indumento subtili deciduo leviter pubescentibus, extus cum perianthii basi tomentosis, glandulis 5 sat magnis ambitu hispido-tomentosis; ovario globoso 2 mm. magno, griseo-tomentoso, stylis 3, ad basim brevissime connatis, supra liberis, quove primo 1 mm. integro, dein 3 mm. partito, nigricante.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8062, October 1936, small substage tree on dry ridges in rain forest.

Croton pilargyros differs from *C. argyratus* Bl., which it very closely resembles in the vegetative characters, in range and in certain details of the flowers, as for instance the length and degree of pubescence of the lobes of the ♀ perianth and the size and pubescence of the glands under the ovary. It is probable that more substantial differences will be revealed when it will be possible to study the fruit, as in the forms of this affinity small variations in the ♀ flower usually prelude to the later evolution of patently unlike capsules and seeds.

It is worth noticing that the species of *Croton* in Malaysia and Australasia fall into few major aggregates, often as many as six to ten species resembling each other so closely in vegetative characters as to prove indistinguishable at first sight. A careful study of the ♀ flower and fruit reveals the specific characters, which are usually far from negligible and consist of differences in the shape and size of the lobes of the ♀ perianth, in the size of the capsule, in the sculpture of the seed, in the presence or absence of petals and the like. It is worth noticing, furthermore, that the species of *Croton* which differ in floral characters but not in foliage are endemic in regions which are known not to have undergone important climatic changes since the Tertiary's inception, such as Australasia. It may thus be tentatively inferred that there is present in the genus a tendency towards the evolution of the ♀ sexual organs which is active regardless of climatic influences. This tendency closely parallels that of the Euphorbiaceae as a whole, in which the floral structures constantly evolve in the direction of apetaly and unisexuality. Far reaching patterns of speciation, involving both floral organs and gross morphology, are apparent, on the other hand, in groups of species (for instance, *C. punctatus* Jacq., *C. texensis* Muell.-Arg. and *C. californicus* Muell.-Arg., endemic as a whole from Venezuela to California) found in regions that have experienced marked climatic vicissitudes in geological times.

***Croton pusilliflorus* sp. nov.**

Arbor parva. Innovationibus inflorescentiisque dissite furfuraceo-tomentellis, trichomatibus stellato-pannosis, citissime glabris, cortice adultiore griseo rimoso. Foliis ovato-ellipticis vel ellipticis, apice plus minusve breviter acuminatis, basi rotundato-cuneatis, 14–6 cm. longis, 5–2 cm. latis, in sicco brunneis, tenellis aequae ac adultis glabris, chartaceis, margine primo intuito vulgo haud profunde serratis, serraturis ad 3–5 per cm. longitudinis, dentibus callosis, venis primariis ca. 7-jugis patentius adscendentibus, anastomosibus delicatis interdum duplicatis; petiolo vulgo nec ultra 3 cm. longo, canaliculato, glandulis 2 subposticis apice insignito. Inflorescentia spicata, [videtur] 10–12 cm. longa. Floribus ♂ ignotis. Floribus ♀: perianthio ca. 2 mm. magno, pedicello brevi, vix ad 2 mm. etiam sub fructu longo, lobis ovatis apice callosis crassiusculis, ad 2 mm. longis et 1.25 mm. latis, quove glandula basali aucto; ovario lepidoto-tomentello, albicante ca. 1.25 mm. magno, stylis 3 fere ad basim liberis, quove primum integro dein partito, vix 1.5 mm. longis; coccis delapsis delicatis, 5–6 mm. longis, epicarpio secedibili brunneo sublevi, trichomatibus glandulosis dissitis parcius obsito, columella valde gracili ad 5–6 mm. longa, semine brunneo scaraboides ad 5 mm. longo et 4 mm. lato, in lateribus subcostulato, caruncula fere nulla, arillo hic inde sub lente maculato, testa sub lente acri vix granulato-striata.

BRITISH NEW GUINEA: Palmer River, below the junction with the Black River, Brass 7226, July 1936, substage tree 12 m. high, in gullies on the higher ridges, alt. 100 m.

Suggesting *C. cassinoides* Lam. of Madagascar in its vegetative characters. The small ♀ perianth, with a very short peduncle even in the fruit-stage, is characteristic.

***Croton semunculus* sp. nov.**

Arbuscula. Innovationibus inflorescentiisque primum leviter stellato-tomentosis, mox glabratis glabrisve, cortice adultiori striato griseo. Foliis late ellipticis vel ovato-ellipticis, 12–4 cm. longis, 6–3 cm. latis, basi rotundatis, interdum rotundato-truncatis, subcordatis, apice abrupte breviter acuminatis, glaberrimis, in sicco brunneis, firme chartaceis vel [videtur] tenuiter subcoriaceis, margine obscure repando-denticulatis, nervis primariis ca. 10-jugis, late patentibus, anastomosantibus valde delicatis; petiolo longitudine ludente, 1–3 cm. longo, obscurius canaliculato, apice glandulis 2 posticis sat magnis sessilibus patelliformibus ornato. Inflorescentia subspicata apicali. Floribus ♂: perianthio ca. 3 mm. magno, pedicello 3–4 mm. longo, staminibus ca. 12, filamentis ca. 3 mm. longo, lobis ovatis, nervosis, ciliatis ca. 1 mm. longis latisque, basi glandula parva [videtur] auctis, petalis ligulatis 1.5 mm. longis et 1 mm. latis. Floribus ♀: perianthio ca. 2 mm. magno, pedicello 0.75–1.5 mm. longo, lobis triangularibus apice acutatis, carnosulis, basi glandula elongata auctis, petalis setaceis magnitudine ludentibus, ovario globuloso ca. 1.75 mm. magno, luteo-tomentoso, columella 3 mm. longa, gracili, semine badio maculis pallidis perspicuis hic inde notato, levissime costulato, vix longiore quam lato, 3 mm. longo, 2.5 mm. lato.

BRITISH NEW GUINEA: Central Division, Nakeo District, Baroka, Brass 3770, April 1933, common in rain-forest, tree 8–10 m.; fruit dry, 8 mm. long.

All the differences I can find between this new species and *C. pusilliflorus*

are the size and mottling of the seed and the presence of petals in the ♀ flower. The size and mottlings of the seed may or may not have specific significance in this exceedingly difficult group and the presence or absence of petals may or may not be relevant depending upon the persistency of the character. Better material will ultimately decide whether *C. pusilliflorus* and *C. semunculus* are distinct species, varieties of the same species or straight synonyms.

Croton Ysabelae sp. nov.

Arbuscula. Innovationibus inflorescentiisque primum dissite argillaceo-stellatis dein glabris, cortice vetustiore pallide ochraceo vel griseo. Foliis alternatis, late ellipticis, apice breviter acuminatis, basi cuneatis vel cuneato-rotundatis, 12–7 cm. longis, 5–3 cm. latis, chartaceis, in sicco brunneis, trichomatibus paucissimis subtus persistentibus exceptis glabris, margine primo intuitu subintegro cautius lustrato obscure repandulo-serrulato vel serrato, nervis primariis 6–8-jugis, late patentibus anastomosibus inconspicuis; petiolo dissite stellato-tomentoso, 1–3 cm. longo, glandulis 2 patelliformibus sessilibus apice utrinque insignito. Inflorescentia graciliori, longe spicata ad 20 cm. longa. Floribus ♂ : perianthio ca. 2.5 mm. magno, staminibus ca. 10, petalis ligulatis. Floribus ♀ : perianthio dissite tomentello, ca. 2 mm. longo, 3 mm. lato, pedicello ca. 1.5–2 mm. longo, lobis vulgo 5, interdum 7 triangularibus, 1.5 mm. longis, 0.75 mm. latis, basi glandula auctis, ovario obscure trigono, globuloso-depresso, 2 mm. crasso, 1 mm. longo, tomentello, stylis 3 habitu recurvis ad basim liberis, quove ca. 1 mm. integro, dein 1.5–2 mm. partito.

SOLOMON ISLANDS: Ysabel Island: Tataba, Brass 3440, May 1933, rain-forest, a small tree, common.

Had this material been collected in Basilan, in the Philippines, it would be difficult to separate it from *C. basilanensis* Croiz. (*Tecson* 24949, 1915), a species in the vicinity of *C. consanguineus* Muell.-Arg. Brass 3440 cannot be referred to *C. Verreauxii* Baill., from which it is distinguished by many intangibles of floral and vegetative parts. Its leaves are not opposite, nor even characteristically whorled, and so it is not likely to prove to be the same as *C. choristadenia* K. Schum. or *C. enantiophyllus* K. Schum., as I interpret these from the descriptions. The ♀ flower is quite small.

Croton Wassi-Kussae sp. nov.

Arbuscula. Innovationibus inflorescentiisque pube furfuraceo-lepidota cupreo-brunnea incrustatis, serius glabratis. Foliis 15–8 cm. longis, 9–4 cm. latis, ovato-ellipticis vel ovatis, apice acuminatis vel cuspidato-acuminatis, basi rotundatis vel rotundato-cordatis, supra in sicco brunneis, lepidibus sparsis valde persistentibus sub lente acri nempe foveolato-punctatis, subtus lepidibus valde furfuraceis subcontiguis more proprio, indutis, brunneo-cupreatis, firme chartaceis vel subcoriaceis, margine subintegris repandulis, nervis primariis ca. 6–8-jugis late adscendentibus apice saepius ramosis, anastomosantibus obscuris, petiolo 2–5 cm. longo furfuraceo vel lepidoto-tomentello, apice glandulis 2 patelliformibus sessilibus in sinu laminae [=cordatione] sitis ornato. Inflorescentia spicata, 2-sexuali, ad 10–11 cm. longa, axillari terminalique. Floribus ♂ : perianthio ca. 6 mm. lato, pedicello ca. 2 mm. longo, lobis ovato-ellipticis ca. 2 mm. longis et

1.5 mm. latis, basi [videtur] glandula acutis, petalis ligulatis ad 3 mm. longis, 0.75–1 mm. latis, staminibus ca. 10, filamentis gracilibus 3–4 mm. longis. Floribus ♂: perianthio 4 mm. lato, 2.5–3 mm. longo, lobis sat crassis, furfuraceo-tomentosis, ca. 2 mm. longis latisque, basi glandula sat magna auctis, margine leviter reduplicativis [scilicet, labiato-subplicatis], petalis nullis; ovario grosse lepidoto-tomentello haud hispido, globuloso-depresso, ca. 3 mm. lato et 2 mm. longo, stylis 3 ad basim liberis, quolibet primum 1 mm. integro, demum in cruribus 2 taeniatis 1 mm. longis diviso; semine ambitu fere quadrangulo, costulato vel costato, ca. 3 mm. longo et 3 mm. crasso, caruncula patelliformi vel potius umbonata hilum totum obtegente, chalaza more proprio minima cicatricosa, arillo brunneo ad chalazam praesertim parcius pallide striato, testa levi, calyce fructu delapso ca. 5 mm. lato, lobis discretis saepius dorso impresso-costatis, pedicello ad 5 mm. longo, columella ad 4 mm. longa.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass 8478* (HOLOTYPE), October 1936, undershrub tree 5 m. high, inland dry ridges of rain-forest; Western Division, Tarara, Wassi Kussa River, *Brass 8491A*, December 1936, common in rain-forest undergrowth, tree 4–5 m. high.

A very distinct species with a seed that closely resembles that of *C. pusilliflorus* Croiz. but is more sharply costate on the back and sides. The chocolate color of the undersurface of the leaf is fully as characteristic as the scurfy-scaly indumentum that gives the leaf this color. The base of the leaf is narrowly and sharply cordate, the glands being set at the inner end of the cordation. The perianth-lobes tend to be reduplicative, as they are in numerous species of the genus, but this tendency is as yet barely marked. A very-interesting form, probably related to *C. morobensis* Croiz., but with an altogether different kind of pubescence. Its further affinities are at present unknown.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

NEW SPECIES, VARIETIES AND COMBINATIONS FROM THE COLLECTIONS OF THE ARNOLD ARBORETUM

ALFRED REHDER

Rubus barbatus Edgeworth in Trans. Linn. Soc. Lond. **20**: 46 [1846], nom. pro-visor. — Focke in Bibl. Bot. **72**: 39 (1910), pro synonym.

Rubus nutans Wallich, Num. List, no. 738 [1829], nom. nud. — G. Don, Gen. Hist. Dichlam. Pl. **2**: 538 (1832). — Edgeworth in Trans. Linn. Soc. Lond. **20**: 45 [1846]. — Walpers, Ann. Bot. Syst. **1**: 276 (1848). — Hooker f. in Bot. Mag. **83**: t. 5023 (1857). — Focke in Bibl. Bot. **72**: 39 (1910). — Non Vest (1824).

Though Edgeworth (l. c.) drew attention to the fact that the name *Rubus nutans* Wallich is invalidated by the earlier name *R. nutans* Vest (in Syll. Pl. Nov. Ratisbon. **1**: 238. 1824) and proposed the new name *R. barbatus* for this species, he nevertheless retained *R. nutans* Wall. and published a description under the latter name. The name *R. barbatus* must therefore be classed as a *nomen provisorium* or *eventuale* and it cannot be considered as validly published. However, as no other name is available for this species, and the application of *R. barbatus* does not leave the slightest doubt, it should be taken up as the valid name for this species.

Rubus idaeus var. **strigosus** f. **succineus**, nom. nov.

Rubus strigosus var. *albus* Fuller ex Bailey, Cycl. Am. Hort. [4] 1582 (1902).

Rubus idaeus var. *aculeatissimus* f. *albus* Fernald in Rhodora, **10**: 50 (1908), non *R. idaeus* 2. *albus* Weston (1770) et *R. i.* var. *albus* Aiton (1789).

Rubus idaeus var. *strigosus* f. *albus* Fernald in Rhodora, **21**: 96 (1919), non Weston (1770), nec Aiton (1789).

For the form of *Rubus idaeus* var. *strigosus* (Michx.) Maxim. with amber-white fruit, the name of *succineus* is here proposed referring to the amber-colored fruit, because there is an older subdivision of the same name under *Rubus idaeus* based on a different type, namely "albus" of Weston and Aiton,¹ based on a form with white or yellowish fruits of the European variety of *R. idaeus*, *R. idaeus* var. *vulgatus* Arrhenius.

Even if Weston's name should be rejected as doubtful, since he characterized the variety as "flore albo" which is apparently a slip of the pen for "fructu albo," Aiton's name would stand.

As Dr. L. H. Bailey informs me, a plant of *R. strigosus* var. *albus* was received from A. S. Fuller under that name and specimens of this plant grown at Cornell University collected in 1890, 1891 and 1892, are in the herbarium of Cornell University. Apparently Fuller never published the name himself; it is not mentioned in his "Small fruit culturist," and by Card in his Bush-fruits, p. 318 (1898), it is referred to only as a white variety of *R. strigosus*.

¹ *Rubus Idaeus* 2. *albus* Weston, Bot. Univ. **1**: 256 (1770). — Aiton, Hort. Kew. **2**: 209 (1789) "β." — K. Koch, Hort. Dendr. 113 (1853) "β."

Rubus idaeus subsp. *vulgatus* f. *luteofructifer* Schneider, Ill. Handb. Laubh. **1**: 510 (1905).

Cytisus villosus Pourret in Mém. Acad. Sci. Toulouse, **3**: 317 (Extr. Chloris Narbon. 21) (1788).

Cytisus nigricans sensu Linnaeus, Mant. Pl. **2**: 444 (1771), non Linnaeus (1753).

Cytisus triflorus L'Héritier, Stirp. Nov. 184 [1791]. — Desfontaines, Fl. Atlant. **2**: 139 [1798]. — De Candolle in Lamarck & De Candolle, Fl. Franç. **4**, **2**: 505 (1805). — Reichenbach f., Icon. Fl. Germ. Helv. **22**: 10, t. 2077, fig. i iii, 1-6 [1867?]. — Nyman, Consp. Fl. Eur. Suppl. 84 [1884]. — Briquet, Études Cytis. 157 (1894). — Ascherson & Graebner, Syn. Mitteleur. Fl. **6**, **2**: 304 (1907). — Bonnier, Fl. Compl. France Suisse Belg. **3**: 6, t. 121, fig. 629 [1914?]. — Non Lamarck (1786).

Lembotropis triflora Presl in Abh. Böhm. Ges. Wiss. ser. 5, **3**: 568 (Bot. Bemerk. 138. 1844) (1845).

Spartocytisus triflorus Webb in Webb & Berthelot, Phytog. Canar. **2**: 45 in nota [1842]. — K. Koch, Dendr. 28 (1869).

Genista triflora Rouy & Foucaud, Fl. France, **4**: 208 (1897).

Cytisus triflorus L'Hérit. apparently has been accepted so far by all authors as the valid name for this species because the date on the title-page of L'Héritier's work, 1784, was taken as the correct date of publication, or cited as 1784 [-85]. It has been shown, however, by J. Britten in Jour. Bot. **43**: 266 (1905) that the work was published in fascicles of which the last one issued and containing pp. 135-184 did not appear until 1791 (see also Cat. Lib. Brit. Mus. **3**: 1108. 1910). This gives to *C. villosus* Pourr. not only three years' priority over *C. triflorus* L'Hérit., but also makes the latter a later homonym of *C. triflorus* Lamarck of 1786 (in his Encycl. Méth. **2**: 250) which is a synonym of *C. hirsutus* L. (1753). The name *C. villosus* has been used again in 1822 by J. S. & K. B. Presl (in their Deliciae pragenses, 36) for a plant belonging according to Briquet (Études Cytis. Alp. Marit. 173. 1894) to *C. supinus* L. or one of its varieties, but that name does not seem to have been taken by any later author, and anyway being a later homonym is not valid.

Viburnum Tsangii (sect. *Odontotinus*), spec. nov.

Viburnum sempervirens K. Koch ex Rehder in Sargent, Trees & Shrubs, **2**: 95, t. 145 (1908), p. p., quoad fig. 4-7.

Viburnum sempervirens var. *trichophorum* sensu Chun in Sunyatsenia, **4**: 263 (1940), non Handel-Mazzetti (1937).

Frutex 1-3 m. altus, ramulis gracilibus, junioribus satis dense flavide villosis tomento ad tertium annum persistente, quadrangulatis, vetustioribus brunneis; folia persistentia, subcoriacea, elliptica vel obovato-elliptica vel oblonga, rarius ovato-oblonga vel anguste oblonga, 3-7, rarius ad 10 cm. longa, 1.5-4 cm. lata, breviter acuminata vel acuta, basi late cuneata vel interdum rotundata, apicem versus remote paucidentata vel fere integra vel integra, supra glabra, subnitentia, saturate viridia, subtus pallidiora, ad costam satis dense vel sparsius pilosa ad nervos laterales sparsius vel sparse pilosa, ceterum glabra, nervis utrinsecus 4-5, supra impressis, subtus elevatis basalibus robustioribus et longioribus et foliis distincte trinerviis; petioli 3-6 mm. longi, dense villosi. Corymbi 2-4 cm. diam., ramulos elongatos terminantes, subsessiles, rarius pedunculo ad 5 mm. longo suffulti, dense fulvo-villosuli et glandulosi, radiis 4-5, rarius 3; flores albi, fragrantés (fide collectoris) in ramulis secundi vel tertii ordinis, brevissime pedicellati, bractea lineari subglabra ovarium paullulo vel vix superante suffulti; calycis lobi ovati ut ovarium oblongum sparse hirsuti, dimidium

tubum corollae aequantes; corolla 4 mm. diam., glabra, lobis ovato-rotundatis reflexis tubo lato longioribus; stamina erecta, filamentis 2.5–3 mm. longis, antheris ovalibus circ. 1 mm. longis; stylus tubum corollae subaequans, stigmatе punctiformi. Drupae rubrae vel luteo-rubrae et edules (fide collectoris) subglobosae; putamen compressum, suborbiculare, 5–6 mm. diam., apice stylo persistente mucronulatum, ventre profunde concavo, dorso convexum laeve et medio laevissime vel vix sulcatum.

Affinis *V. sempervirenti* K. Koch sed ramulis corymbo petiolis dense villosis, foliis tantum subcoriaceis in sicco non nigricantibus ad costam subtus pilosis, corymbo minore plerumque 3–4-radiato et habitu graciliore facile distinguitur.

TONKIN. Ha-coi, Taai Wong Mo Shan and vicinity: Tong Fa Market, *W. T. Tsang*, 29571 (TYPE in herbarium Arnold Arboretum, ut cetera specimina citata), Sept. 11–23, 1939 (height 4 ft.; fruit yellowish red, edible); Chan Uk Village near Chuk-phai, *W. T. Tsang*, 28977, May 3–10, 1939 (height 5 ft.; flowers white, fragrant); Shui Mei Village, northeast of Chuk-phai, *W. T. Tsang*, 29281, June 23–30, 1939 (height 5 ft.; fruit reddish-yellow, edible); Chuk-phai, *W. T. Tsang*, 27264, Nov. 18 – Dec. 2, 1936 (height 7 ft.; fruit red, edible). Tien-yen: Kau Nga Shan and vicinity, *W. T. Tsang*, 27432, Dec. 23–29, 1936 (height 5 ft.; fruit red, edible), and 30507, Sept. 23 – Oct. 7, 1940. Dam-ha: Sai Wong Mo Shan (Sai Vong Mo Leng), Lung Wan Village, *W. T. Tsang*, 29838, 30132, May 18 – July 5, 1940; Sai Wong Mo Shan, Long Ngong Village, *W. T. Tsang*, 30229, July 18 – Sept. 9, 1940.

CHINA. Kwangtung: Fang Ch'eng Distr., Na Leung and vicinity, *W. T. Tsang* 26524, July 24–31, 1936 (fruit red, edible); Fang Ch'eng Distr., Kung P'ing Shan and vicinity, *W. T. Tsang* 26646, Aug. 15–24, 1936 (height 5 ft.; fruit reddish black, edible); Kochow Distr., *Tsiang Ying* 2296, May 14, 1929. Kwangsi: Hop Po Distr., *H. Y. Liang* 69354, 69395, June 5, 12, 1937; east of Tung Hing City, *H. Y. Liang* 69460, July 7, 1937 (shrub, 1 m.); Na Pa, Sup Man Ta Shan, *H. Y. Liang* 69532, 69541, July 9, 1937 (shrub, 1–2 m.). Hainan: Bo-ting, *S. K. Lau* 28162, Nov. 9, 1936 (height 3 m., fruit orange); Manning, *S. K. Lau* 28255, Nov. 26, 1936 (height 3 m.). Yunnan: Szemao, s. mountains, alt. 5000 ft. *A. Henry* 12753, 1896–99.

Viburnum Tsangii is closely related to *V. sempervirens* K. Koch, from which it differs chiefly in the dense yellowish villous pubescence of the branchlets persisting to the third year, in the pubescent inflorescence and sparingly hairy ovary and calyx, in the villous petioles and the pilose midrib of the underside of the leaves which are less coriaceous and generally smaller; the whole habit of the plant is slenderer. The specimens collected in Kwangsi by *H. Y. Liang* under no. 69395, and 69541 cited above and two other specimens I have not seen, were referred by Chun (l. c.) to *V. sempervirens* var. *trichophorum* Hand.-Mazz., but this variety, of which I have isotypes before me, has a different pubescence consisting on the branchlets of distinct very short fascicled hairs and a short pubescence on the inflorescence, otherwise it has all the characters of typical *V. sempervirens*; it was described by Handel-Mazzetti (in Bot. Centralbl. Beih. 56: 465. 1937) from Chekiang which constitutes the northern limit of the range of *V. sempervirens*; to var. *trichophorum* I have referred *W. T. Tsang* from Kwangtung and *H. H. Chung* 7963 from Fukien which agree also in the comparatively broad mostly elliptic or ovate leaves with the other specimens of this variety. The occurrence of the variety falls within the range of *V. sempervirens* which extends, according to the material in our herbarium from Kwangsi and Hainan, through Kwangtung and Fukien to

Chekiang and east to Kiangsi and southeastern Kweichou (*Cavalerie 1056* and *Tsiang 6385*). *Viburnum Tsangii* is of more southwestern distribution and ranges from northeastern Tonkin to southern Kwangsi and Kwangtung to Hainan and west to southeastern Yunnan (*Henry 12753* from Szemao).¹

***Viburnum Tsangii* f. *xanthocarpum*, forma nov.**

A typo differt drupis luteis.

TONKIN. Tien-yen, Ho Yung Shan and vicinity, *W. T. Tsang 30742*, Oct. 13 – Nov. 22, 1940

A form with bright, rather light yellow fruits. Forms with yellow or orange-colored fruit have been observed in several red-fruited species; such are: *Viburnum dilatatum* Thunb. f. *xanthocarpum* Rehd., *V. betulifolium* Batal. f. *aurantiacum* Rehd., *V. setigerum* Hance f. *aurantiacum* Rehd., *V. Opulus* f. *xanthocarpum* (Endl.) Rehd., *V. Sargentii* Koehne f. *flavum* Rehd.

***Lonicera Rockii* (sect. *Isika* ser. *Purpurascetes*), spec. nov.**

Frutex 0.60–1 m. altus, glaber, ramosus, ramulis annotinis epidermate brunneo in laminas deciduas solubili et partim delapso et ad nodos petiolorum bases dilatatas persistentes gerentibus, vetustioribus cortice cinereo fibroso obtectis; gemmae circiter 3 mm. longae, squamis 2 exterioribus carinatis acutiusculis interioribus evolutis majoribus late ovalibus subfoliaceis. Folia nondum perfecte evoluta, ovalia, obtusiuscula, circa 1 cm. longa, glabra vel interdum subtus ad costam sparse glandulosa, brevipetiolata. Flores coetani, plerumque 2 vel 4 paria in ramulis valde abbreviatis simul cum foliis immaturis congestis e gemmis axillaribus orientibus, bini in pedunculo brevissimo, bracteis 2 ovatis vel oblongo-ovatis 6–7 mm. longis obtusiusculis basi attenuatis suffulti; ovaria ad apicem connata, subglobosa, 2 mm. alta, trilocularia loculis pluri-ovulatis; calyx cupularis, irregulariter crenato-dentatus, 0.5–0.7 mm. altus; corolla anguste infundibuliformis circa 1 cm. longa, basi saccata, extus glabra lutea (fide collectoris), tubo intus piloso triente superiore excepto, lobis 5 suborbicularibus vix 2 mm. longis suberectis; stamina 5, antheris oblongis 2 mm. longis quam filamentis glabris paullo longioribus et limbum subaequantibus; stylus lobos paullo superans, basi sparse pilosa excepta glaber. Fructus non visus.

Affinis *L. saccatae* Rehder, sed differt praecipue glabritie, foliis ovalibus, pedunculis brevissimis, bracteis latioribus et corolla lutea.

CHINA. Yunnan: Mount Peimashan, Mekong-Yangtze divide between Aduntze and Pungtzer, *J. F. Rock 9246*, in 1923 (HOLOTYPE in herb. Arnold Arb.) shrub 2–3 ft., flowers yellow).

This new species seems to be related to *L. saccata* Rehd. and particularly to its var. *Wilsoni* Rehd., but is easily distinguished by its glabrousness, its small oval leaves, smaller nearly sessile yellowish flowers with broader ovate to oblong-ovate bracts. The flowers appear with the leaves in the axillary clusters of small crowded leaves along last year's branches and are often partly hidden by the not yet fully developed leaves; their color is given as yellow by the collector, but I suppose it is nearer yellowish or yellowish

¹ *Henry 12753* I had cited in 1908 (l. c.) under *V. sempervirens* with the remark that it differs from the typical form in its pubescence and referred again to it under that species in 1935 (in *Jour. Arnold Arb.* 16: 331).

white as in some other species of this series as *L. obovata* Royle, *L. microphylla* Willd. and *L. canadensis* Marsh. In general appearance at flowering time, the species resembles more some glabrous forms of *L. coerulea* L. and *L. cyanocarpa* Franch. than *L. saccata*.

Lonicera oreodoxa H. Smith in herb., spec. nov. (sect. *Isika* ser. *Bracteatae*.)

Frutex humillimus, circ. 10 cm. altus ramis tenuibus pilosis pilis per plures annos persistentibus; gemmae ovoideae, 1.5-2 mm. longae, perulis 2 exterioribus, interioribus accrescentibus scariosis rubescentibus. Folia ovalia vel ovato-ovalia, 6-12 mm. longa et 4-9 mm. lata, obtusa vel acutiuscula basi rotundata, supra sparse longe pilosa, subtus satis dense praecipue ad costam nervosque longe accumbenti-pilosa, 2-3-nervia nervis adscendentibus subtus ut costa elevatis, supra obsolete et costa basin versus leviter impressa; petioli 1-2 mm. longi, pilosi. Flores axillares e basi ramulorum hornotinorum orientes, plerumque par unum pro quoque ramulo, bini in pedunculo gracili laxo piloso 10-12 mm. longo; bracteae late ovatae acutiusculae margine irregulariter subdentatae et piloso-ciliatae, nervosae, 1 cm. longae, extus pilosae, intus sparsius breviter pilosae, piloso-ciliatae, ovaria et basim corollae obtegentes; bracteolae nullae; ovaria distincta, ovoidea, 2 mm. longa, glabra, calyce 5-dentata dentibus late ovatis 1.5 mm. longis ciliatis coronata; corolla 2-2.5 cm. longa tubuloso-infundibuliformis, basi saccata, apicem versus sensim dilatata, limbo subpatente circ. 2 cm. lato, extus sparse glandulosa et sparsissime praesertim ad lobos pilosa, lobis orbiculari-ovatis 6-7 mm. latis, tubo intus piloso triente superiore excepto; stamina 5, antheris exsertis et quam corollae lobis paullo brevioribus anguste oblongis, filamentis 4 mm. longis glabris paullo infra faucem insertis; stylus staminibus aequilongus infra medium longe pilosus. Fructus non visus.

Affinis videtur *L. finitimae* W. W. Sm. sed pube piloso non setoso, foliis minoribus subtus satis dense pilosis, calycis dentibus distinctis, corollae lobis latoribus stylo infra medium longe et satis dense piloso, statura humillima differt.

CHINA. Northern Szechuan: Dongnergo in alpineto 4700-4800 m. alt., July 21, 1922, *Harry Smith*, 3349 (in herb. Upsala et in herb. Arnold Arb.) "frutex humillimas ad 1 dm. altus."

A very distinct species belonging to ser. *Bracteatae* and apparently nearer to *L. finitima* W. W. Sm. than to any other species of this series, but the latter differs markedly in the setose not pilose pubescence, in the larger leaves setose above and on the veins beneath, larger winter-buds, the nearly obsolete calyx-teeth, the oblong-ovate corolla-lobes and the glabrous style. *Lonicera oreodoxa* is remarkable for its low stature, being a densely branched shrub only about 10 cm. high, and for the small size of the leaves hardly exceeding 1 cm. and the comparatively large flowers; it must be quite showy in bloom which probably induced Dr. H. Smith to bestow upon it the specific epithet "*oreodoxa*." I saw this species first in 1928 in the herbarium of Upsala, when Dr. H. Smith kindly gave me a duplicate of it for the Arnold Arboretum.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

JOURNAL

OF THE

ARNOLD ARBORETUM

VOL. XXIII

OCTOBER, 1942

NUMBER 4

PLANTAE PAPUANAE ARCHBOLDIANAE, X*

E. D. MERRILL AND L. M. PERRY

LIKE earlier papers of the series, this contains descriptions of novelties and records of range-extensions or sometimes of older names which have not yet found their way into current use in this flora. The miscellany includes families from the Balanophoraceae to the Ceratophyllaceae, the Connaraceae, Leguminosae, Datisceae, Haloragaceae, Loganiaceae, and a note on *Mastixiodendron* Melchior. Several people at different times have contributed to the determinations for the Leguminosae of the various Archbold Expeditions. While naming the 1938-39 collection, we have re-checked the others for the range-extensions which are here recorded, appending to each, where known, the name of the person who made the determination. Although not wholly in favor of designating *subspecies* in preference to *varieties*, we have followed the nomenclature of Danser in the Polygonaceae and of Mattfeld in the Caryophyllaceae to avoid nomenclatural changes in groups with which we are not at all familiar.

BALANOPHORACEAE

Balanophora J. R. & G. Forster

Balanophora papuana Schlechter, Bot. Jahrb. **50**: 68. f. 1, A-E. 1913; Harms, Nat. Pflanzenfam. ed. 2, **16b**: 334, f. 168. 1935.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, Brass 12232, January 1939, alt. 700 m., frequent in open places between Pandanus prop-roots, etc., in rain-forest ravine (orange-brown warty masses $\pm$ 20 cm. diameter, 15 cm. high).

Previously known from Northeastern New Guinea.

ARISTOLOCHIACEAE

Aristolochia Linnaeus

Aristolochia gracilifolia O. C. Schmidt, Bot. Jahrb. **58**: 490. 1923.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, Brass 12909, February 1939, alt. 1200 m., climbing to 3 m. in oak forest undergrowth

*Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **23**: 233-297. 1942.

(flowers greenish white, tinged and veined with purple). **BRITISH NEW GUINEA:** Mafulu, *Brass* 5229, September–November 1933, alt. 1250 m., climbing in undergrowth of limestone regions, uncommon (flowers closely purple-reticulate over a yellowish ground color).

These collections suit the original description of this species fairly well. In *Brass* 5229 the leaves are 7–8 cm. long, 2.2–3 cm. broad, while those of *Brass* 12909 are 22 cm. long, 5 cm. broad. The inflorescences are 7 cm. and 17 cm. long respectively, the shorter being axillary, the longer apparently lateral. In spite of the difference in the size of the leaves and the position of the inflorescence, the similarity of the flower-buds as well as the leaf-shape and venation is good evidence that the two are conspecific.

The type of *Aristolochia pithecurus* Ridl. ought to be examined. The description of the flower is very much like that of this species. It is to be noted, however, that the flowers are described as sessile and the bracts as 1 cm. long. Further, Lauterbach described an isotype (*Bot. Jahrb.* **52**: 106, 1914), *Forbes* 621 deposited in the Leiden Herbarium, as representing flowering material of *A. momandul* K. Schum. Evidently the collection was a mixture.

Aristolochia tagala Cham. *Linnaea* **7**: 207, *t.* 5. *f.* 3. 1832; Merr. *Enum. Philip. Fl. Pl.* **2**: 120. 1923.

Aristolochia megalophylla K. Schum. in K. Schum. & Hollr. *Fl. Kaiser Wilhelms Land* 104. 1889; *Warb. Bot. Jahrb.* **13**: 300. 1891; K. Schum. *Notizbl. Bot. Gart. Berl.* **2**: 113. 1898; K. Schum. & Lauterb. *Fl. Deutsch. Schutzgeb. Südsee* 302. 1900; Rechinger, *Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien* **89**: 549. 1913; Lauterb. *Bot. Jahrb.* **52**: 106. 1914.

BRITISH NEW GUINEA: Daru Island, *Brass* 6382A; Mabaduan, *Brass* 6504, climbing in second growth rain-forest; Lake Daviumbu, Middle Fly River, *Brass* 7718, large climber common in second growth rain-forest. **SOLOMON ISLANDS:** Bougainville: Karngu, Buin, *Kajewski* 2225, vine climbing rain-forest trees.

Although in most instances the leaves of the New Guinean specimens are larger than those of the Philippine material, we have been unable to find any real specific differences.

POLYGONACEAE

Rumex Linnaeus

Rumex Brownii Campdera, *Mon. Rumex*, 64, 81. 1819; Danser, *Bull. Jard. Bot. Buitenz. III.* **8**: 131. 1927; l. c. **13**: 429. 1935.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass* 11387, November 1938, alt. 2200 m., very abundant weed in native gardens and about villages.

Reported previously from a collection in the mountains of British New Guinea. The field note indicates that the plant is aggressive.

Polygonum Linnaeus

Polygonum benguetense Merr. *Philip. Jour. Sci.* **10**: 301. 1915; *Enum. Philip. Fl. Pl.* **2**: 122. 1923.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9036, 9437, August 1938, alt. 3225 m., with mosses and small sedges on shores of lake, common (prostrate and ascending; flowers white).

These collections are a reasonably good match for the Philippine material. The species has been considered as a variety of *Polygonum strigosum* R. Br. by Steward, but until further material is available to show intermediate variations we prefer to maintain it as a species.

Polygonum minus subsp. **decipiens** Danser, Bull. Jard. Bot. Buitenz. III. **8**: 178. 1927; l. c. **13**: 429. 1935.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9436, 9512, August 1938, alt. 3225 m., ascending to 1 m. among tall sedges of the lake shore and covering muddy places on drying margins of the lake (flowers pink).

Reported by Danser from Papua on a collection of an earlier Archbold Expedition.

Polygonum minus subsp. **depressum** Danser, Bull. Jard. Bot. Buitenz. III. **8**: 176, f. 9. 1927.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9544, August 1938, alt. 3225 m., frequent with *Eriocaulon*, *Ranunculus*, etc. on open boggy ground (prostrate and spreading to 20 cm. diameter; flowers pink).

Although the leaves are smaller, 1–1.5 cm. long, than usual in this plant, and the spikes are shorter, it is too much like Danser's figure and a collection from Java to place it elsewhere. Danser gives the range as India, Sumatra, and Java.

Polygonum lapathifolium Linn. Sp. Pl. 360. 1753; Danser, Bull. Jard. Bot. Buitenz. III. **8**: 185. 1927.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11623, December 1938, alt. 1600 m., common in old ditches (about 1 m. high; flowers pink).

As far as we know the species has not previously been recorded from New Guinea, although it is known from Malaysia and Australia.

Polygonum runcinatum subsp. **papuanum** Danser, Bull. Jard. Bot. Buitenz. III. **13**: 430. 1935.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9123, August 1938, alt. 3225 m., plentiful in shrubberies bordering forest, scrambling and sometimes densely massed; southern slopes of Grand Valley, *Brass* 9260 (coll. *Capt. Teerink*), August 1938, alt. 1800–2000 m.; 9 km. northeast of Lake Habbema, *Brass* 10759, October 1938, alt. 2800 m., scrambling to 2–3 m. in young second growths on native clearings (flowers green); Bele River, 18 km. northeast of Lake Habbema, *Brass* 11504, November 1938, alt. 2200 m., scrambling in grassy second growth, common.

This species was previously reported by Danser from Mount Tafa, Papua. On account of the extension of range, we have recorded these collections and note the fact that the field-notes indicate it is fairly common in the region.

AMARANTHACEAE

Deeringia R. Brown

Deeringia amaranthoides (Lam.) Merr. Interpret. Rumph. Herb. Amb. 211. 1917; Rehder, Jour. Arnold Arb. **14**: 66. 1933.

Achyranthes amaranthoides Lam. Encycl. **1**: 548. 1785.

Deeringia baccata (Retz.) Moq. in DC. Prodr. **13**²: 236. 1849; K. Schum. & Hollr. Fl. Kaiser Wilhelms Land 42. 1889; Warb. Bot. Jahrb. **13**: 303. 1891; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 303. 1900.

Deeringia celosioides R. Br. Prodr. 413. 1810; F. v. Muell. Pap. Pl. **1**: 41. 1876; F. M. Bail. Queensl. Agric. Jour. **23**: 220. 1909.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2164, August 1930, alt. 900 m., rain-forest.

Apparently this is the first record of this fairly wide-ranging species from the Solomon Islands.

AIZOACEAE

Glinus Linnaeus

Glinus oppositifolius (L.) Aug. DC. Bull. Herb. Boiss. II. 1: 559. 1901; Pax & Hoffman, Nat. Pflanzenfam. ed. 2, 16c: 222, f. 95 A-D. 1934.

Mollugo oppositifolia Linn. Sp. Pl. 89. 1753.

Glinus Spergula (L.) Fenzl in Spreng. Nom. Bot. ed. 2, 1: 688. 1840; Pax, Nat. Pflanzenfam. 3(1b): 40. 1889; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 308. 1900; Pulle, Nov. Guin. 8: 355. 1910.

BRITISH NEW GUINEA: Penzara, between Morehead and Wassi Kussa Rivers, *Brass* 8446, December 1936, abundant on shaded banks of waterhole.

This species has been recorded from New Guinea previously as *Mollugo* and as *Glinus Spergula* (L.) Pax.

Mollugo Linnaeus

Mollugo pentaphylla Linn. Sp. Pl. 89. 1753; Merr. Enum. Philip. Fl. Pl. 2: 135. 1923.

Mollugo stricta Linn. Sp. Pl. ed. 2, 131. 1762; F. v. Muell. Pap. Pl. 2: 43. 1886; Warb. Bot. Jahrb. 13: 305. 1891; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 308. 1900; Rechinger, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien 89: 551. 1913.

BRITISH NEW GUINEA: Daru Island, *Brass* 6386, a wet season ephemeral, gregarious on hard compacted soil; Baroka, Nakeo District, *Brass* 3735, damp soil on savanna flat, rare.

PORTULACACEAE

Montia Michaux

Montia lamprosperma Cham. Linnaea 6: 565. 1831; Fernald & Wiegand, Rhodora 12: 138, t. 84c. 1910; von Poellnitz, Rep. Sp. Nov. 30: 317. 1932; Pax & Hoffm. Nat. Pflanzenfam. ed. 2, 16c: 259. 1934.

NETHERLANDS NEW GUINEA: 4 km. northeast of Wilhelminatop, *Brass & Myer-Drees* 9972, September 1938, alt. 3650 m., prostrate on banks of a grassland stream.

The genus is new to Papuasias. The species is one of several which form the aggregate species *Montia fontana* L. reported from southern Australia and New Zealand as well as being wide-spread in north temperate regions. *Montia fontana* L. sensu strictu has much duller and minutely tuberculate seeds.

Portulaca Linnaeus

Portulaca quadrifida Linn. Mant. 1: 73. 1767; Merr. Enum. Philip. Fl. Pl. 2: 136. 1923; von Poellnitz, Rep. Spec. Nov. 37: 275. 1934.

SOLOMON ISLANDS: Ula wa: *Brass* 2991, October 1932, common on beach sands (whole plant very fleshy; flowers yellow). A widespread tropical weed apparently not previously recorded from the Solomon Islands.

CARYOPHYLLACEAE

Stellaria Linnaeus

Stellaria saxatilis Buch.-Ham. in Don, Prodr. Fl. Nep. 215. 1825; Edgeworth & Hook. f. Fl. Brit. Ind. 1: 232. 1874; Handel-Mazzetti, Symb. Sin. 7: 190. 1929.

Stellaria laxa Merr. Philip. Gov. Lab. Bur. Bull. **29**: 12. 1905, Enum. Philip. Fl. Pl. **2**: 138. 1923, non F. Behm. (1887).

Stellaria stellato-pilosa Hayata, Jour. Coll. Sci. Tokyo 25, Art. **19**: 58, t. 2. 1908.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass* 10728, October 1938, alt. 2800 m., scrambling over shrubs and ferns in native clearings in the forest (flowers white); Bele River, 18 km. northeast of Lake Habbema, *Brass* 11582, November 1938, alt. 2200 m., very abundant about native villages, scrambling over garden fences, etc. (flowers white).

As far as we know the genus is new for New Guinea. The collections are a good match for *Stellaria laxa* Merr. from the Philippines and the plate of *S. stellato-pilosa* Hay. and as far as we can judge from the somewhat meager material from India, it is not specifically distinct from *S. saxatilis* Buch.-Ham. We also have a few collections from Yunnan which appear to belong to this species. If we are correct in our identification of this material this is an extension of the range of this Himalayan species known to occur in the high mountains of Yunnan, Formosa, Luzon, possibly in Java, and now in New Guinea. We have not seen any material from Java and hence, we are not sure of the identity.

Cerastium Linnaeus

Cerastium Keysseri Schlechter in Diels, Bot. Jahrb. **62**: 478. 1929; Mattf. Bot. Jahrb. **69**: 270. 1938.

NETHERLANDS NEW GUINEA: northern slopes of Mount Wilhelmina, *Brass & Myer-Drees* 10089, September 1938, alt. 4150 m., under a rock on alpine grassland.

This is a very compact little plant with small flowers agreeing fairly well with the description of the type. It does not differ essentially from some Clemens' collections cited by Mattfeld except that it is much more compact and hence appears more pubescent, the narrowed base of the leaves and the internodes are much shorter than in the plant of looser habit, but we have not found any apparent specific differences. Previously known only from Northeastern New Guinea.

Cerastium papuanum subsp. **geminiflorum** Mattf. Bot. Jahrb. **69**: 269. 1938.

NETHERLANDS NEW GUINEA: Northern slopes of Mount Wilhelmina, *Brass* 10081, September 1938, alt. 3950 m., alpine grassland, in thick soft mats on moist rocks.

This collection is a good match for the isotype, *Brass* 4309, from Mount Albert Edward.

Cerastium papuanum subsp. **phaenops** var. **eciliatum** Mattf. Bot. Jahrb. **69**: 269. 1938.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass* 9122, August 1938, alt. 3225 m., scrambling on grass tussocks about forest margins (flowers white); 11 km. northeast of Wilhelminatop, *Brass & Myer-Drees* 9720, September 1938, alt. 3400 m., rather dry western slope, grassy place (flowers white).

Here again these two collections appear to be conspecific with the isotype of this variety collected on Mount Albert Edward.

Sagina Linnaeus

Sagina belonophylla Mattfeld, Bot. Jahrb. **70**: 468. 1940.

NETHERLANDS NEW GUINEA: 7 km. northeast of Wilhelminatop, *Brass & Myer-Drees* 10021, September 1938, alt. 3650 m., alpine grassland, cushioned on moist rocks

(flowers white); northern slopes of Mount Wilhelmina, *Brass & Myer-Drees 10086*, September 1938, alt. 3950 m., common on old grassy screes, in cushions 12–15 cm. diameter. *Sagina belonophylla* Mattf. was described from a collection made on Mount Sarawaket in 1937.

Sagina papuana Warb. Bot. Jahrb. **16**: 14, 21. 1892; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 310. 1900; van Steenis, Bull. Jard. Bot. Buitenz. **13**: 181. 1934; Mattf. Bot. Jahrb. **69**: 270. 1938.

NETHERLANDS NEW GUINEA: 11 km. northeast of Wilhelminatop, *Brass & Myer-Drees 9744*, September 1938, alt. 3400 m., wet grassy valley; northern slopes of Mount Wilhelmina, *Brass & Myer-Drees 10041*, September 1938, alt. 4050 m., forming loose cushions in long grass of old rock screes; 9 km. northeast of Lake Habbema, *Brass 10552*, October 1938, alt. 2800 m., prostrate and matted in open beds of streams (flowers white).

This species has been recorded from Northeastern New Guinea, Papua and the Philippines. Mattfeld has already pointed out that it shows considerable variation. Although we have eight collections at hand, these still are not sufficient for us to define the specific limits. In addition we have two other collections: Lake Habbema, *Brass 9202, 9438A*, August 1938, alt. 3225 m., matted on open boggy ground and gregarious on open low shores of lake (flowers white). These plants do not have the long decumbent twining stems characteristic of the other collections but are fairly short as if they grew in tussocks. The calyx is shorter, as in the original description, and the petals are lacking. The leaves are not so definitely cuspidate, and the capsule is longer than the calyx, but owing to the variation within the species we are inclined to believe the differences here are environmental rather than inherent.

Sagina echinosperma Hayata, Icon. Pl. Formos. **3**: 39. 1913; Masamune, Short Fl. Formos. 61. 1936.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11569*, November 1938, alt. 2350 m., rooting in earthy niches on a sparsely vegetated limestone precipice (flowers white).

Although the collection and the original description show some little differences, in view of the variation in our material of *Sagina papuana* Warb., it is perhaps better at present to place the collection with the Formosan species. Hayata's description does not mention the minute pustulations on the leaves, nor the $\pm$ remote hairs on the lower surface of the midrib. The petals (4 mm.) in the New Guinea material are longer than the sepals and the fully mature seeds are 0.6–0.8 mm. long. There are 10 stamens, those opposite the sepals have a glandular base as in *S. papuana* Warb. Although this appears to be a rather disrupted range, it is to be noted that *Stellaria saxatilis* Buch.-Ham., with a much wider range, has been found in the same localities. This is evidently a montane plant.

NYMPHAEACEAE

Nymphaea Linnaeus

It has been somewhat difficult to name the collection of *Nymphaea* L., not only on account of the lack of material for comparison, but also owing to the varying interpretations writers have given the species of this genus.

Further, most workers have had the advantage of handling living plants. In the New Guinean collections there are apparently five distinct species, three of which belong to the "gigantea-group." In that group five species have been described, all Australian except *N. gigantea* Hook., which has been reported from New Guinea. There has been considerable variance of opinion in interpreting *N. violacea* Lehm. Whatever the species may really be, we seem to have at present no alternative to placing three Papuan collections in it. With the exception of *Brass* 5842, which we have named *N. pubescens* Willd., the flowers of the material of *N. violacea* Lehm. are the largest in the collections under consideration.

Nymphaea violacea Lehmann Hamb. Garten- und Blumenzeit. 9: 218. 1853; Henkel, Rehnelt & Dittman, Das Buch Nymphae. 65. 1907.

Nymphaea Brownii F. M. Bail. Queensl. Fl. 1: 39. 1899.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7607, few plants in water of swamps (underside of leaves violet-colored; flowers pale blue); same locality, *Brass* 7610, commonest species in the great lagoons and swamps (lateral nerves of leaves scarcely visible on the upper surface; underside of leaves violet-colored; flowers white, peduncles striped with purple); Dagwa, Oriomo River, *Brass* 5949, few plants in small pond on savanna, uncommon (leaves floating flatly on water, pale and smooth above and dark purple beneath except the green midrib and veins; petioles marked with very fine purple lines; flowers raised 15–20 cm. above surface of water on peduncles heavily lined with dark purple; sepals outside very dark with streaked markings of deep purple and yellow-green, inside bluish white; petals blue with a purple tinge towards the apex; stamens pale yellow; fertilized flowers retracted to bottom of pond by snake-like coiling of peduncles).

We have not attempted to assemble the synonymy of this species. The material agrees well with Bailey's description of *Nymphaea Brownii* and also seems to be in accord with *N. violacea* Lehm. The flowers are larger than in either of the species we have described, the seeds are smaller than in *N. macrosperma* and very minutely reticulate.

Nymphaea macrosperma sp. nov.

Folia in sicco coriacea glabra cordato-suborbicularia $\pm$ 17 cm. longa 14 cm. lata margine 1.5–2 cm. remote repando-dentata, dentibus brevissimis interdum mucronatis, supra minutissime elevato-punctata, subtus costa valida nervis primariis utrinque $\pm$ 6 palmatim dispositis elevatis reticulatim conjunctis marginem versus subevanidis; floribus 6–7 cm. diametro; sepalis 4 oblongis 3 cm. longis 1.2 cm. latis apice obtusis; petalis $\pm$ 14 oblanceolato-oblongis 3 cm. longis apice obtusis; staminibus numerosis, antheris oblongis 3 mm. longis apice apiculatis vel obtusis, filamentis filiformibus; radiis stigmaticis 10 oblongo-cuneatis apice obtusis; seminibus $\pm$ 4 mm. longis 3 mm. diametro, oblongis vel leviter ovoideis, more affinitatis lineis pubescentibus ornatis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7608 (TYPE), August 1936, plentiful in open water of swamps and lagoon and rooting in water up to 2 fathoms deep (underside of leaves violet-colored, nerves clearly visible on the upper surface; flowers blue); Lake Daviumbu, *Brass* 7606, pink form of the common blue water-lily, one plant seen.

This species has smaller flowers and leaves than *Nymphaea Casparyi* Rehnelt & Henkel but is unquestionably of that alliance. The ovary is

naked between the ring of stamens surrounding the stigmatic rays and the insertion of the petals at the base.

***Nymphaea dictyophlebia* sp. nov.**

Folia in sicco coriacea glabra cordato-suborbicularia 37–45 cm. longa 34–37 cm. lata margine 2–3 cm. remote dentata, dentibus 3–4 mm. longis sublinearibus, supra minutissime elevato-punctata, subtus costa valida nervis primariis utrinque $\pm$ 11 palmatim dispositis prominentibus reticulatim conjunctis; floribus 7–8 cm. diametro; sepalis 4 obovatis 3 cm. longis vix 2 cm. latis apice obtusis; petalis $\pm$ 24 obovato-oblongis basi angustatis 3.5 cm. longis 1–1.5 cm. latis apice obtusis interioribus angustioribus; staminibus numerosis ($\pm$ 400), antheris oblongis exterioribus 4.5 mm. longis obtuse apiculatis, interioribus brevioribus obtusis, filamentis filiformibus vel paullo complanatis; radiis stigmaticis $\pm$ 14, cuneatis apice rotundatis.

BRITISH NEW GUINEA: Penzara, between Morehead and Wassi Kussa Rivers, *Brass* 8437 (TYPE), December 1936, plentiful in a permanent waterhole (flowers deep blue, 7–8 cm. diameter).

This collection seems to be most nearly related to *Nymphaea Casparyi* Rehnelt & Henkel. It differs in the thicker leaves with less remotely dentate margin and longer teeth, and the obviously elevated venation on the lower surface. The petals are mostly inserted just above the sepals, only four narrow ones being slightly higher. The stamens are massed in a ring surrounding the stigmatic rays. This may be one of the plants included in *N. gigantea* Hook. in earlier works, but the present tendency is to limit this species to those plants having very large flowers.

Barclaya Wallich

Barclaya Motleyi Hook. f. Trans. Linn. Soc. **23**: 157, *t.* 21, *f.* 1–5. 1860; Becc. in D'Albertis' New Guinea **2**: 396. 1881; F. v. Muell. Pap. Pl. **2**: 3. 1885; Pulle, Nov. Guin. Bot. **8**: 361. 1910.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13604, March 1939, alt. 850 m., massed in muddy deeply shaded pools in rain-forest streams, totally submerged except the open flowers (leaves brown; petals green).
BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7072, June 1936, alt. 100 m., massed in beds of shallow muddy or gravelly streams in forest, scarcely distinguishable from the decaying leaves of the stream bottoms (leaves blackish green appearing brown under water; sepals brown; petals brown-green).

These collections vary from the Bornean material in having obovate-oblong leaves with less pubescence on the lower surface. Some of the plants are larger than any seen in the Bornean collections, the leaves are 6.5–20 cm. long, 3.5–14.5 cm. broad.

CERATOPHYLLACEAE

***Ceratophyllum* Linnaeus**

Ceratophyllum submersum Linn. Sp. Pl. ed. 2, 1409. 1763; van Steenis, Bull. Jard. Bot. Buitenz. III. **13**: 103. 1933.

BRITISH NEW GUINEA: coast between Oriomo and Fly Rivers, *Brass* 6458, April 1936, massed in open water in *Melaleuca Leucadendron* swamp-forest (plant brown). According to van Steenis, the species has been found only once in Malaysia, in Java at low altitudes.

CONNARACEAE

Rourea Aubl.**Rourea simulans** sp. nov.

Frutex magnus scandens, ramulis novellis ferrugineo-tomentosis; foliis imparipinnatis, petiolo rhachique 7–12 cm. longis pubescentibus; foliolis 3–5-jugis suboppositis vel interdum subalternis breviter petiolatis, oblongo-lanceolatis basi rotundatis apice acutiusculis vel breviter obtuse acuminatis, 1.5–7.5 cm. longis et 0.8–2.5 cm. latis, supra subglabris brunnescentibus subnitidulis subtus glaucescentibus consperse pubescentibus, costa supra impressa subtus prominente atque subtomentulosa, nervis primariis utrinsecus 6–10 patentibus circiter 3 mm. a margine arcuatim anastomosantibus; inflorescentiis paniculatis $\pm$ 4 cm. longis terminalibus axillaribusque plerumque pluribus aggregatis in axillis; axi, ramis, pedicellis calycibusque breviter hirtellis; sepalis ovatis vix 2 mm. longis obtusiusculis; petalis circiter 5 mm. longis; staminibus brevissimis.

BRITISH NEW GUINEA: Lower Fly River (east bank), Gaima, *Brass* 8288 (TYPE), November 1936, rain-forest borders (large climbing shrub; flowers white).

The species is very closely allied to *Rourea Radlkoferiana* K. Schum. It differs in the softly tomentose new branchlets, the pubescent or hirtellous leaf-rhachis, the leaflets sparsely pubescent beneath and only shortly acuminate or acutish; the axis of the inflorescence and the calyx are hirtellous. We are not, as yet, wholly convinced that *Santaloides* (L.) Schellenberg is anything more than a geographical segregate; for this reason we have described the new species in *Rourea*.

LEGUMINOSAE

Archidendron F. von Mueller

With practically no material for comparison, and no key to the species of the genus already described, it has been very difficult to determine our material of *Archidendron* F. v. Muell. from descriptions only. Harms very distinctly states that he includes *Hansemannia* K. Schum. in *Archidendron* F. v. Muell. but does not transfer the species already described in the former genus. From the literature and the material at hand, we are wholly in agreement with the single generic concept; however, on account of the variability in our collections, we are transferring to *Archidendron* only those species of *Hansemannia* which have points of contact with our material.

Archidendron Schlechteri Harms, Bot. Jahrb. 55: 40. 1917.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 14054, April 1939, alt. 50 m., common marginal tree in flooded rain-forests of river plain (plant 8–10 m. high; flowers white, in supra-axillary panicles).

Apart from the somewhat shorter and stouter inflorescence branches, this collection agrees very well with the isotype. Another collection either belonging to or closely allied with this species is *Brass* 8006, Lower Fly River, east bank opposite Sturt Island, October 1939, rain-forest (flowers white; inflorescence lateral on branchlets and smaller branches). This differs from the other collection in having a slightly shorter and more

campanulate calyx, a little narrower and longer corolla, and lateral inflorescences. All are very closely allied to *Archidendron Lucyi* F. v. Muell. of Queensland, which has slightly larger flowers. Our material is too scanty to estimate the amount of variation within species of the genus.

***Archidendron gawadense* (Bak. f.) comb. nov.**

Hansemannia gawadensis Bak. f. Jour. Bot. **61**: Suppl. 13. 1923.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7351, July 1936, alt. 100 m., undergrowth of river flood-plain forest (slender tree 5 m. high; leaves scattered along the upper 2 m. of stem; flowers white, in numerous fascicles axillary or lateral between the leaves).

This is Baker's own determination. Since he gives no clue in the original description to the species affinity, we note that, as far as may be judged from their descriptions, the species is close to *A. graciliflorum* Harms and *A. parviflorum* Pulle. In the collection cited, the inflorescence-axis is about 3 cm. long, and the flowers are crowded at the apex.

***Archidendron Ledermannii* Harms, Bot. Jahrb. **55**: 42. 1917.**

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13822, alt. 50 m., frequent in rain-forest on low lying alluvial soil (tree 2-3 m. high, branched or not; inflorescence on lower stem). Described from Northeastern New Guinea.

***Archidendron papuanum* sp. nov.**

Arbor $\pm$ 7.5 m. alta glabra; ramulis novellis viridescentibus; petiolo 10 cm. et rhachi primaria 8 cm. secundariaque 7-10 cm. longis; pinnis bijugis; foliolis 2-3-jugis ellipticis 7-11 cm. longis, 4-5.5 cm. latis, basi obtusis vel subrotundatis apice obtusiusculis, costa utrinque conspicua, nervis primariis utrinsecus + 5 utrinque prominulis, reticulo distincte manifesto; petiolulis 2 mm. longis in sicco atrofusis, glandulis interpetiolaribus interrachideisque applanatis vel depressis; inflorescentiis lateralibus (in specimine typico) 7 cm. longis; ramis brevibus; pedicellis 3 mm. longis; calyce campanulato 6 mm. longo breviter irregulariter lobulato; corolla (in alabastro apiculata) 1.5 cm. longa apice in lobis lanceolatis fissa; tubo stamineo in parte inferiore cum corolla connato; ovariis 5 stipitatis glabris.

BRITISH NEW GUINEA: Vailala River, Ihu, *Brass* 1110 (TYPE), March 1936, on riverbank (spreading glabrous tree 25 feet tall; large very dark green bipinnate leaves; petiole at insertion on stem and petiolules at insertion on rhachis much swollen; conspicuous white flowers on last year's wood).

Possibly this species is related to *Archidendron incurvatum* Lauterb. & K. Schum., but the calyx-tube is almost twice as long, and the leaflets are not acuminate.

***Archidendron megaphyllum* sp. nov.**

Arbor sine ramis 14 m. alta; foliis $\pm$ 1 m. longis; pinnis unijugis; petiolo 20 cm. et rhachi pinnae 66 cm. longis minute pubescentibus; foliolis 5-jugis superioribus late ellipticis 25 cm. longis, 15 cm. latis, basi inaequilateralibus apice obtusiusculis apiculatis, supra in costa nervisque minute pubescentibus, subtus in costa nervisque dense in lamina consperse ferrugineo-pubescentibus, costa supra plana subtus elevata, nervis primariis utrinsecus $\pm$ 6 supra manifestis subtus prominulis, venulis subtus subclathratis, reticulo supra inconspicuo subtus distincto; petiolulo 1 cm. longo; inflorescentiis lateralibus brevibus, axi 3-4 cm. longo; calyce 3-4 mm. longo

pubescente; corolla puberula; legumine $\pm$ 7 cm. longo, 2 cm. lato, inconspicue breviter tomentoso, valvis valde coriaceis; seminibus verisimiliter 7–8 nigris oblongis, 1.5 cm. longis, vix 1 cm. latis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7227 (TYPE), July 1936, alt. 100 m., rain-forest substage, rare (unbranched tree 14 m. tall, with a few large leaves $\pm$ 1 m. long, forming a scant crown, and several thick twisted pods in fascicles on the stem).

Perhaps this species is related to *Archidendron molle* (K. Schum.) comb. nov. (*Hansemannia mollis* K. Schum. Bot. Jahrb. **9**: 202. 1888—published as a separate 1887). It differs from the latter species in that the leaves are not oblong nor densely pubescent on either side, and the calyx is not glabrous.

Serianthes Benth

Serianthes minahassae (Koorders) comb. nov.

Albizzia minahassae Koord. Mededeel. Lands Plant. **19**: 416–419. 1898 (Fl. N. O. Celeb.); Suppl. Fl. N. O. Celebes **1**(1): 13, t. 4. 1918.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Neth. Ind. For. Serv. bb.* 25681, *Brass* 13970, *Brass & Versteegh* 13546, July 1938, April 1939, alt. 50 and 100 m., rain-forest of flood plains, common on higher inundation levels (flat-topped tree up to 30 m. high; fruit dark brown); 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 13182, April 1939, alt. 750 m., primary rain-forest, frequent on the slopes (tree 32 m. high, 49 cm. diameter; flowers yellow-brown; fruit dark brown). SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2143, August 1930, alt. 900 m., rain-forest (very large tree up to 35 m. high. Used for rafters in ceremonial houses). Previously known from the Celebes.

Serianthes Ledermannii Harms, Bot. Jahrb. **55**: 43. 1917; C. T. White, Jour. Arnold Arb. **10**: 219. 1929.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7349, July 1936, alt. 100 m., forests of river flood-banks (tree attaining 30 m.; crown umbrella-shaped; trunk narrowly spurred; bark brown, lenticellate; wood pale, yellowish, with a nauseating odor; leaflets smooth and shining above, underside grey) (det. E. G. Baker); Lower Fly River, east bank opposite Sturt Island, *Brass* 8076, October 1936, rain-forest, occasional on banks of river (conspicuous tree up to 20 m. tall; branches erect and eventually flat-spreading from a short grey stem; leaflets smooth and shining above, grey below; flowers white; pods brown pubescent).

The following is a brief description of the pod (scarcely mature): 16 cm. long, 3.9 cm. broad, finely pubescent to glabrate and inconspicuously veined, epicarp very thin, brown, not easily removed, endocarp subligneous, 1 mm. thick; seeds 8–10, dark brown.

Pithecellobium Martius

Pithecellobium palauense Kaneh. Bot. Mag. Tokyo **48**: 733. f. 3. 1934 (October).

Pithecolobium palauense Hosokawa, Trans. Nat. Hist. Soc. Formos. **24**: 414. 1934 (November).

SOLOMON ISLANDS: San Cristobal: Waimamura, *Brass* 2665, August 1932, coast rain-forest on coral limestone, common (handsome spreading tree 25 m. tall; pale brown lenticellate bark; branchlets and leaves very dull dark green; flowers white, with long thin contorted stamens).

A comparison of Hosokawa's description with that of Kanehira's, published a month earlier, leaves no doubt that the two are identical. The greatest discrepancy is in the description of the pod and this we attribute

to a difference in the age of the fruits in each collection. The flowers and the leaves of the Solomon Islands collection are a little larger and the axis of the inflorescence is slightly pubescent, but we cannot see any specific differences between the two. Both grow on coral limestone.

***Pithecellobium novo-guineense* sp. nov.**

Arbor 6-9 m. alta; ramulis griseo-brunnescentibus glabris; foliis bipinnatis; petiolo 6-11 cm. et rhachi primaria 5-9 cm. secundariaque 6-13 cm. longis; pinnis 2-jugis; foliolis 2-4-jugis glabris oppositis ellipticis 6-12 cm. longis, 3.3-6 cm. latis, basi anguste rotundatis apice breviter acuminatis, costa subtus prominente, nervis primariis utrinsecus + 6 patentiadscendentibus prope marginem arcuatis, supra manifestis subtus prominulis, reticulo utrinque distincto; petiolulis vix 3 mm. longis; glandulis interpetiolularibus; inflorescentiis verisimiliter lateralibus, axibus 3-4 fasciculatis usque 25 cm. longis; floribus probabiliter sessilibus; calyce circiter 3.5 mm. longo puberulo, tubo anguste campanulato, dentibus brevibus acutis; corolla 1 cm. longa fere glabra, lobis circiter $\frac{1}{2}$ tubi longitudinem aequantibus; filamentis exsertis; ovario glabro breviter stipitato; legumine valde incurvato circiter 7 cm. longo, 8 mm. lato, margine inferiore late crenulato, seminibus + 10 oblongis 6 mm. longis, 4 mm. latis, leviter compressis in sicco brunnescentibus in margine convexo atrobunnescentibus.

BRITISH NEW GUINEA: Kappa Kappa, *Brass* 824 (TYPE), December 1925, coast brushes (tree 20-30 feet tall; fruit bright red).

Although the specimen is somewhat broken, we are unable to place it among the named species of *Pithecellobium*. Two inflorescences are unattached but their bases suggest that they were lateral rather than axillary, as in *P. caulostachyum* Merr. of the Philippines. All the flowers are loose, but the two fruits both have remnants of the flower persisting, and these are sessile.

***Pithecellobium Clypearia* var. *velutinum* var. nov.**

Differt a forma typica foliolis subtus dense fulvo-velutinis; pedicellis 5 mm. longis.

BRITISH NEW GUINEA: Ononge Road, Dieni, *Brass* 3932 (TYPE of var.), April-May 1933, alt. 500 m., rain-forest (slender grey barked tree 20 m. tall; leaves smooth above, covered with pale brown hairs beneath; flowers pale greenish yellow; pods red).

This collection very closely resembles both *Pithecellobium Clypearia* Benth. and *P. angulatum* Benth. It has the obtusish leaflets of the first and the long pedicels of the second. It differs from both in the dense indument on the lower surface of the leaves, but appears to be more like that of the first in the quality of the pubescence. The foliar glands are very short-stipitate or subsessile. Certainly it does not wholly coincide with either specific concept as at present delineated. Perhaps it is a species in its own right, but more material for comparison would be necessary to establish this.

***Albizzia* Durazzini**

Albizzia retusa Benth. in Hook. Lond. Jour. Bot. **3**: 90. 1844; Merr. Enum. Philip. Fl. Pl. **2**: 247. 1923.

Albizzia littoralis Teysm. & Binn. Nat. Tijdschr. Ned. Ind. **29**: 259. 1867; Val. Bull. Dept. Agric. Ind. Neerl. **10**: 16. 1907

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13988, April 1939, alt. 50 m., frequent in rain-forest subject to flooding (large buttressed tree attaining a height of 30 m.; flowers white with red stamens). BRITISH NEW GUINEA: Lower Fly River (east bank), Gaima, *Brass* 8316, November 1936, rain-forest second growths (one example — tree 10 m. high; leaflets greyish beneath; flowers white with purple stamens).

The material seems to correspond fairly well with this Malaysian species. It has previously been reported from Netherlands New Guinea under the name of *A. littoralis* Teysm. & Binn.

Albizzia falcata (L.) Backer, Voorl. Schoolfl. Java 109. 1908; Beknopte Fl. Java Atl. 5, Fam. 119: 10. 1941.

Adenanthera falcata Linn. in Stickman Herb. Amb. 14. 1754, Amoen. Acad. 4: 124. 1759.

Albizzia moluccana Miq. Fl. Ind. Bat. 1(1): 26. 1855.

This species, already recorded from New Guinea several times under the name of *A. moluccana* Miq., is represented in our herbarium by the following numbers: *Neth. Ind. For. Serv. bb.* 22225, *Brass & Versteegh* 11176, 11176A, 12575, 13141, *Brass* 576, 5397, 8359, *Clemens* 935. From the Solomon Islands we have: Bougainville: *Kajewski* 1937, *Waterhouse* 94 (ser. no. 22698); Ysabel: *Brass* 3223.

Albizzia lebbekioides (DC.) Benth. in Hook. Lond. Jour. Bot. 3: 89. 1844.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5858, January–March 1934, alt. 20 m., few trees scattered over small area on savanna (tree 7–8 m. tall, thickly foliated; branches drooping; hard grey bark; flowers numerous in greenish white globose heads) (det. van Steenis). A Malaysian species seemingly recorded for the first time in New Guinea.

Acacia Willdenow

Acacia aulacocarpa var. ***macrocarpa*** Benth. Fl. Austr. 2: 410. 1864.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 6017, 6024, January–March 1934, alt. 30 m., abundant in savanna forests (grey foliated shapely tree attaining large size; rough grey fissured bark) (det C. T. White).

This and the two following species are apparently Australian species native also in New Guinea.

Acacia crassicarpa A. Cunn. ex Benth. in Hook. Lond. Jour. Bot. 1: 379. 1842; F. M. Bail. Queensl. Fl. 2: 511. 1900.

BRITISH NEW GUINEA: Wassi Kussa River, Tarara, *Brass* 8699, 8718, December 1936, January 1937, distinctive tree of brownish appearance forming a large part of both savannah and light rain-forests on low ridges of clay along the river (shapely tree attaining 20 m.; bark dark grey, hard, deeply fissured, inner bark red; wood yellowish); Lake Daviumbu, Middle Fly River, *Brass* 7673, September 1936, plentiful on lake shores in rain-forest and in contact zone of rain-forest and savannahs) (det. E. G. Baker). Northern Australia, Queensland.

Acacia leptocarpa A. Cunn. ex Benth. in Hook. Lond. Jour. Bot. 1: 376. 1842; F. M. Bail. Queensl. Fl. 2: 510. 1900.

BRITISH NEW GUINEA: Wassi Kussa River, Tarara, *Brass* 8531, common on savannah forest ridges (tree 10–12 m. high with hard deeply fissured grey bark); Gaima, Lower Fly River (east bank), *Brass* 8257, open savannah forests (tree 6–8 m. high, usually in groups; bark rough, deeply fissured; phyllodes somewhat glaucous) (det. E. G. Baker). Queensland.

Acacia Mangium Willd Sp. Pl. 4: 1053. 1806; F. M. Bail. Queensl. Fl. 2: 513. 1900.

NETHERLANDS NEW GUINEA: Agonda, *Neth. Ind. For. Serv. bb.* 22332 (det. van

Steenis). BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5696, 5697, common tree of tall savannah and about rain-forest borders (det. C. T. White).

Probably the same plant was reported by F. von. Mueller from Papua as *Acacia holosericea* A. Cunn. For a discussion of the nomenclature and synonymy, cf. C. T. White, *Contr. Arnold Arb.* 4: 42. 1933. Already known in the northern regions of Australia and in Malaysia.

Acacia pennata (Linn.) Willd. *Sp. Pl.* 4: 1090. 1806; Merr. *Enum. Philip. Fl. Pl.* 2: 249. 1923.

Mimosa pennata Linn. *Sp. Pl.* 522. 1753.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13776, 13916, 14098, April 1939, alt. 50 m., very abundant in low growths fringing creeks on deeply flooded river plain (large prickly scandent shrub; flowers white). Tropical Asia, Malaysia, Africa. Not previously reported from Papuasia.

Adenanthera Linnaeus

Adenanthera microsperma Teysm. & Binn. *Nat. Tijdschr. Nederl. Ind.* 27: 58. 1864; Koord. & Val. Mededeel. Lands Plant. 11: 279 (*Bijdr. Boomsoort. Java* 1: 279). 1894.

NETHERLANDS NEW GUINEA: Hollandia, Bernhard Camp, *Neth. Ind. For. Serv. bb.* 25744, August 1938, alt. $\pm$ 500 m.; Bernhard Camp, Idenburg River, *Brass & Versteegh* 13567, April 1939, alt. 570 m., frequent in primary rain-forest (tree 28 m. high, 45 cm. diameter; flowers yellow; fruits green). The first specimen cited was identified by van Steenis. We have not yet found any other record of the species in New Guinea.

Piptadenia Bentham

Piptadenia novo-guineensis Warb. *Bot. Jahrb.* 13: 453. 1891; Rechinger, *Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien* 89: 557. 1913; C. T. White, *Jour. Arnold Arb.* 10: 219. 1929.

Schleinitzia microphylla Warb. *op. cit.* 336.

SOLOMON ISLANDS: San Cristobal: Magoha River, *Brass* 2736, August 1932, common in rain-forests (very handsome spreading tree 20 m. high, with brown fissured bark; petals white; stamens pink with yellow anthers); Balego-Nagonago, *Brass* 2698, August 1932, alt. 350 m., common in rain-forests on crest of spurs (handsome tree attaining a very large size and towering above most other trees in the hill forests). These Solomon Islands collections differ from the New Guinean material only in the new growth being more pubescent. Previously reported from New Guinea and Bougainville.

Parkia R. Brown

Parkia Versteeghii sp. nov.

Arbor usque 35 m. alta; ramulis brunnescentibus puberulis lenticellatis; foliis bipinnatis; petiolo 5–7 cm. longo puberulo supra basim glandulam ellipticam concavam ferente, rhachi 17–23 cm. longa patenti-pubescente vel glabrescente, rhachibus secundariis 6–10 cm. longis patenti-pubescentibus, trichomis brunnescentibus; pinnis 10–16-jugis suboppositis, glandulis inter superiores parvis concavis ellipticis vel suborbicularibus; foliolis 4–7 mm. longis, 2–3 mm. latis, 15–30-jugis utrinque consperse pubescentibus vel glabratis oblongis obtusis minute apiculatis basi suboblique truncatis angulis obtusis margine leviter recurvatis, costa utrinque prominula, nervis primariis utrinsecus 4–5 subobscuris; inflorescentiis dense capitatis pyriformibus ad anthesim 3.5–4 cm. longis, 2.3–2.5 cm. latis; pedunculo 12–25 cm. longo angulato; bracteolis anguste spathulatis apice concavo obtusis dorso hir-

tellis; floribus basi breviter stipitatis, stipite circiter 2 mm. longo pubescente; calycis tubo $\pm$ 7 mm. longo, lobis extus pubescentibus 2 posticis concavis vix 1.5 mm. diametro crassiusculis, 3 anticis vix 1 mm. diametro tenuibus; petalis 5, lineari-oblongis obtusiusculis apice versus extus puberulis basim versus cum tubo stamineo adnatis; filamentis basi connatis in parte libera $\pm$ 8 mm. longis (in floris neutris multo longioribus versus apicem consperse pilosulis), antheris anguste oblongis; ovario longe stipitato apice parce pilosulo, stylo glabro.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13824, *Brass & Versteegh* 14020 (TYPE), April 1939, alt. 50 and 75 m., rain-forest, common on swampy edges of river flood plain (canopy tree 28-35 m. tall; flowers cream-color or yellowish; heads pendent).

The genus appears to be new for New Guinea. The species is perhaps closely related to *Parkia speciosa* Hassk. of Malaya and Sumatra; it differs in the larger pyriform heads and the suboblique and less distinctly veined leaflets.

Cynometra Linnaeus

?Cynometra novo-guineensis sp. nov.

Arbor vel frutex; ramulis tenuibus atrofusculis glabris; foliis brevissime petiolatis, petiolo 4-6 mm. longo ruguloso; foliolis unijugis oblique interdum late lanceolatis 4-7 cm. longis, 1-3 cm. latis, utrinque fere aequaliter angustatis basi cuneatis obliquis apice late acuminatis, acumine $\pm$ 1 cm. longo, 3-5 mm. lato emarginato, glabris, nervis costa excepta inconspicuis; inflorescentiis axillaribus subumbellatis paucifloris; bracteis circiter 1 mm. longis obtusis striatis; pedicellis 4 mm. longis glabris; sepalis 5 oblongo-lanceolatis subirregularibus vix 2 mm. longis versus basim $\pm$ connatis; petalis minimis (uno tantum viso); staminibus 10, antheris late ellipticis minute apiculatis; ovario brevissime stipitato versus apicem conspersissime piloso, stylo glabro; fructibus non visis.

NETHERLANDS NEW GUINEA: Hollandia, Bernhard Camp, *Neth. Ind. For. Serv.* bb. 25712 (TYPE), August 1938, alt. 50 m.

This species somewhat resembles *Cynometra Warburgii* Harms of the Philippines, but in the former the axis of the inflorescence is more reduced, the leaflets are broader and very inconspicuously veined.

Maniltoa Scheffer

Maniltoa cynometroides sp. nov.

Arbor parva; ramulis brunnescentibus lenticellatis; petiolo 5-7 mm. longo ruguloso, rhachi 5-7 mm. longa minute puberula; foliolis bijugis sessilibus vel subsessilibus valde inaequilateralibus late obovato-cuneatis (terminalibus 2.8-4 cm. longis 1.8-2 cm. latis, lateralibus 1.9-2.9 cm. longis 0.8-1.3 cm. latis) a medio basim versus sensim angustatis apice rotundatis vel suboblique truncatis summo breviter obtuseque emarginatis, costa a margine antico 2-5 mm. distante, nervis primariis inconspicuis; inflorescentiis terminalibus et in axillis foliorum superiorum, non visis; axi circiter 5 mm. longo minute pubescente; pedicello vix 1 cm. longo crasso minute pubescente; staminibus 20 vel ultra; legumine arcuatim complanato-ovoideo immaturo 2 cm. longo, 1.5 cm. lato.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass*

6903 (TYPE), June 1936, alt. 100 m., one of the smaller trees of ridge-forest canopy layer, common (pods unripe; flowers not seen).

The plant immediately suggests *Cynometra* Linn., but at the base of two fruits a partial ring of stamens still adheres. These are in two rows; there are at least 20 on the fruits, we cannot be sure how many more there may have been in the flowers. From the dried parts of the calyx casually adhering, we assume that the flower is glabrous.

***Maniltoa plurijuga* sp. nov.**

Arbor 24–29 m. alta; ramis glabris; ramulis petiolis rhachibusque ferrugineo-hirtellis; petiolo $\pm$ 1 cm. et rhachi 6–15 cm. longis; foliolis 7–14-jugis sessilibus valde inaequilateraliter oblongis vel oblongo-sub-rhomboides 2.5–4 cm. longis, 8–10 mm. latis, basi latere postico rotundato-obtusis apice obtusiusculis sub apice 1–3 mm. emarginulatis, costa circiter 2 mm. a margine antico distante subtus nonnumquam parce hirtella, nervis primariis reticuloque supra leviter impressis subtus inconspicuis; ceteris ignotis.

NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13539* (TYPE), April 1939, alt. 650 m., rare tree of primary rain-forest on slope of ridge (24 m. high, 48 cm. diameter; bark black); Bernhard Camp, Idenburg River, *Brass & Versteegh 14007*, April 1939, alt. 140 m., frequent on ridges of primary rain-forest (tree 29 m. high, 55 cm. diameter).

Here we have departed from our usual custom not to describe sterile specimens even when we are fairly sure that they represent new species. These collections, however, appear to be well marked by foliar characters. Their alliance is with *Maniltoa urophylla* Harms, but the leaflets are definitely not acuminate, a character which Harms emphasizes in the specific name chosen, in the original description, and also in the comment following it.

***Maniltoa Brassii* sp. nov.**

Arbor gracilis $\pm$ 9 m. alta; ramulis brunnescentibus copiose lenticellatis; petiolo 8–10 mm. longo glabro, rhachi 4–14.5 cm. longa lenticellata; foliolis 3–4-jugis subsessilibus oblique lanceolatis (6–)8–16 cm. longis, (2.5–)3–5.5 cm. latis, basi inaequilateraliter obtusis latere postico subrotundatis vix auriculatis apice obtuse acuminatis, acumine emarginato, costa a margine antico 0.8–1.5 cm. distante, nervis primariis in latere postico 7–11 utrinque prominulis, reticulo laxo supra inconspicuo subtus distincto; inflorescentiis densifloris terminalibus axillaribusque sessilibus probabiliter subglobosis, 6 cm. latis, axi circiter 6 cm. longo ferrugineo-pubescente; bracteis ovatis acutis $\pm$ 3 cm. longis inferis glabris superioribus pubescentibus; pedicellis 3–5 mm. longis pubescentibus basi bibracteolatis, bracteolis $\pm$ 1 cm. longis oblongis subcarinatis in costa margineque pubescentibus; receptaculo circiter 5 mm. longo utrinque pubescente; sepalis 4 inaequalibus $\pm$ 14 mm. longis extus minute pubescentibus vel glabratis; petalis non visis; staminibus $\pm$ 45, filamentis basi pubescente connata excepta glabris, antheris 2 mm. longis minute apiculatis; ovario sessili dense pubescente, stylo 2.5 cm. longo basi pubescente, stigmate subcapitellato.

BRITISH NEW GUINEA: Central Division, U-uma River, *Brass 1428* (TYPE), May 1928, in light rain-forests (tall slender tree 30 feet or more).

In the compact inflorescence, and in the union of the stamens above the

usual ring at the base, this species apparently is related to *Maniltoa megaloccephala* Harms; nevertheless, it is distinct in several characters. The lower part of the filaments seems to be more or less united with the pubescent cupular receptacle or calyx-tube; the pedicels are unusually short, likewise the bracts at their base; and the densely pubescent ovary is not stipitate.

Kingiodendron Harms

Kingiodendron alternifolium (Elmer) Merr. & Rolfe, Philip. Jour. Sci. **4**: 267. 1909; Merr. Enum. Philip. Fl. Pl. **2**: 255. 1923.

Cynometra alternifolia Elmer, Leaflet. Philip. Bot. **1**: 223. 1907.

Hardwickia alternifolia Elmer, op. cit. 362. 1908.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8004, 8101, October 1936, rain-forest, on river flood plains (large canopy tree with hard grey shallowly fissured bark; flowers greenish or white). Probably *Neth. Ind. For. Serv. bb. 28911*, Hollandia, August 1939, also belongs here.

In 1936 B. L. Burtt described a species of *Kingiodendron* from the Solomon Islands and one from Fiji. This seems to be the first time the genus has been found in New Guinea. These collections, determined by E. G. Baker, are a very good match for the Philippine material of this species.

Crudia Schreber

Crudia subsimplicifolia Merr. Philip. Jour. Sci. Bot. **5**: 39. 1910, Enum. Philip. Fl. Pl. **2**: 256. 1923.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8182, undergrowth of flood-plain rain-forest (nondescript tree 3–4 m. high) (det. E. G. Baker); Vailala River, Ihu, *Brass* 908, rain-forests (tall buttressed tree with scaly pale brown bark and hard brown wood; inflorescence racemose, terminal on lateral shoots).

Type from the Philippines; the genus appears to be new to Papuan records. The first cited collection compares favorably with *Wenzel* 1252, a collection without fruit from the Philippines; the leaves, however, are somewhat more coriaceous and the inflorescence is more elongated. In *Brass* 908 the pods are elliptic, apiculate, 7 cm. long, 4 cm. wide, more mature than in the other Papuan collection, and the apex is a little less excentric.

Bauhinia Linnaeus

Bauhinia Schlechteri Harms, Bot. Jahrb. **55**: 55. f. 3. 1918.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13951, April 1939, alt. 50 m., frequent in rain-forest of river flood-plains (tree $\pm$ 20 m. high, 35 cm. diameter; flowers conspicuous and pleasantly fragrant, petals white, the two lower ones orange-red at base. Type from Northeastern New Guinea.

Bauhinia monandra Kurz, Jour. As. Soc. Beng. **42**(2): 73. 1873, For. Fl. Brit. Burma **1**: 395. 1877.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5652, alt. 100 m., growing thickly on old garden clearings, probably introduced (large bush or small tree; numerous showy flowers, standard pale pink heavily marked with red, other petals pale pink) (det. C. T. White). Introduced.

Mezoneurum Desfontaines

Mezoneurum Scortechinii F. v. Muell. in Wing's South. Sci. Rec. **2**: 73. 1882; F. M. Bail. Queensl. Fl. **2**: 451. 1900.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7498, August 1936, rain-forest (large liane ascending to the tree-tops; leaflets grey beneath; flowers yellow).

This is a Queensland species seemingly collected for the first time in New Guinea. Another species in Papuasia, *Mezoneurum Peekelii* Harms, allied to those of Malaysia, was described from the Bismarck Archipelago.

Ormosia Jackson

Ormosia calavensis Azaola in Blanco Fl. Filip. ed 2: 230. 1845; Prain, Jour. As. Soc. Beng. 69(2): 180. 1900 (Bot. Notes Papil. 390. 1901); Merr. Enum. Philip. Fl. Pl. 2: 269. 1923; Kaneh. Bot. Mag. Tokyo 45: 285. 1931, Fl. Micrones. 144, f. 49. 1933.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh* 13599, April 1939, alt. 300 m., rare on slopes in primary rain-forest (tree 24 m. high, 55 cm. diameter; fruit black). BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7514, August 1936, rain-forest, rare (tree 14 m. high; leaves somewhat glaucous below; numerous stiff fruiting panicles erect at apex of crown; seeds red) (det. E. G. Baker).

This species is one of the most wide-spread of the genus, having been collected in the Philippines, the Moluccas, Palau Island, and now New Guinea.

Gompholobium Smith

Gompholobium papuanum sp. nov.

Frutex gracilis rigens 1.5 m. altus glaber; ramulis atrobrunnescentibus; foliis pinnatis; petiolo rhachique 9–13 mm. longis; stipulis minute subulatis caducis; foliolis 11–15 paribus suboppositis lineari-oblongis vel lanceolatis, 7–12 mm. longis, 1–2 mm. latis, basi acutis apice acutis apiculatis margine revolutis, supra atro-viridescentibus subtus pallidioribus, nervis inconspicuis vel obscuris; petiolulis 0.5 mm. longis; floribus solitariis in ramulis brevibus terminalibus pedicellatis; pedicellis 4–5 mm. longis minute bracteolatis; calyce 1 cm. longo, lobis 5 lanceolatis acutis basi 3 mm. connatis; petalis verisimiliter persistentibus, vexillo late reniformi unguiculato apice emarginato 1.3 cm. lato, 1.1 cm. longo includente unguiculum 2 mm. longum, alis oblongis 9 mm. includente 1.5 mm. unguiculum longis, 2.5 mm. latis, carina 1.1 cm. incl. 2.5 mm. unguiculum longa, 4 mm. lata; legumine depresso ovoideo 5 mm. longo, 8 mm. lato, subsessili (stipite 0.5 mm.), 6-ovulato, seminibus subreniformibus vix 3 mm. latis, 1.5 mm. longis, strophiole minimo corrugato hyalino hilum circumdante.

BRITISH NEW GUINEA: Wassi Kussa River, Tumbuke, *Brass* 8432 (TYPE), December 1936, occasional in *Agonis* scrubs (stiff slender shrub 1.5 m. high; persistent petals yellow).

A species evidently related to *Gompholobium nitidum* Benth., but the leaflets are not oblong-cuneate nor emarginate. Apparently this is the first report of the presence of this Australian genus in Papuasia.

Tephrosia Persoon

Tephrosia leptoclada Benth. Fl. Austr. 2: 207. 1864; F. M. Bail. Queensl. Fl. 2: 393. 1900.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, *Brass* 8395, December 1936, savannah forest, common in clumps on ridges (undershrub; flowers red) (det. E. G. Baker). Previously known from Queensland.

Tephrosia maculata sp. nov.

Frutex erectus usque 1 m. altus; ramulis pubescentibus pilis patentibus vel retrorsis; foliis breviter petiolatis, petiolo 5 mm. et rhachi 2.5–3 cm. longis patenti-pubescentibus; stipulis setaceo-subulatis caducis; foliolis oppositis 3–4-jugis anguste oblongis vel leviter cuneatis, 1.7–3 cm. longis, 0.7 cm. latis, terminali paullo majore 3.5–4.5 cm. longo, 0.8–1 cm. lato, basi obtuse cuneatis apice leviter retusis supra parce subtus $\pm$ dense pubescentibus, nervis primariis valde adscendentibus, petiolulis 1 mm. longis patenti-pubescentibus; racemis in ramis brevibus terminalibus demum elongatis 2.5–(in fructu) 10 cm. longis; pedicellis 3–5 mm. longis pubescentibus; calyce patenti-pubescente, tubo 1.5 mm. longo, lobis lineari-subulatis quam tubo paullo brevioribus; vexillo suborbiculari unguiculato 6 mm. longo, 4 mm. lato, extus pubescente, alis 5 mm. longis carinam superantibus; legumine 2.8 cm. longo, 4 mm. lato, fere recto; seminibus $\pm$ 5 oblongis, 3 mm. longis, 2 mm. latis maculatis.

BRITISH NEW GUINEA: Nakeo District, Baroka, *Brass* 3703 (TYPE), April 1933, alt. 50 m., common on savannah forest grasslands (erect shrub with branched top, up to 1 m. tall; leaves greyish beneath; flowers pale purple).

This collection was determined by Mr. C. T. White as *Tephrosia* aff. *phaeosperma* F. v. Muell. This unquestionably is its relationship. Except on the lower surface of the leaflets, it has a spreading rather than a silky pubescence, the flower is slightly smaller than in the related species, and the seeds are mottled.

Millettia Wight & Arnott

Millettia australis (Endl.) Benth. in Miq. Pl. Junghuhn. 250. 1852; Dunn, Jour. Linn. Soc. Bot. **41**: 163. 1912.

Pterocarpus australis Endl. Prodr. Fl. Norf. 94. 1833.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8214, October 1936, rain-forest (very large flowering screening liane of riverbanks; petals violet, whitish beneath) (det. E. G. Baker).

Described from Norfolk Island, also reported from Queensland and New South Wales. Up to the present we have found, besides this, two records of *Millettia* Wight & Arn. in Papuasias; Dunn, op. cit. 237, excludes one of these from the genus, and the other is a doubtful record of his own, op. cit. 169, 170.

Desmodium Desvaux

Although we have found no new species of *Desmodium* Desv., we are making the following brief record either to indicate range-extensions or older specific names than the ones in our New Guinea index of plants always bearing in mind that this is not a complete index: *Desmodium laxum* DC., *Brass* 911; *D. Muelleri* Benth., *Brass* 6522; *D. nemorosum* var. *simplex* Schindl., *Brass* 3788, 7911, 8344, 8653; *D. microphyllum* DC., *Brass* 3659, 5320; *D. trichostachyum* Benth., *Brass* 7526; *D. triflorum* (L.) DC., *Brass* 6347; *D. sequax* Wall. (*D. sinuatum* Bl.), *Brass* 5512, 11254, 11799; *D. zonatum* Miq., *Brass* 3516.

Dalbergia Linnaeus filius

Dalbergia Albertisii Prain, Jour. As. Soc. Beng. **70**(2): 62. 1901, Ann. Roy. Bot. Soc. Calcutta **10**(1): 33. t. 5. 1904.

BRITISH NEW GUINEA: Lepokera, Vailala River, *Brass* 990, February 1926, low swampy rain-forests (large Rambler or climber; leaves pale green, shining above); Gulf Division, Keuru, *Brass* 1202, March 1926, common strand plant, occurring sometimes in the mangrove formations (rambling shrub or climber, glabrous; bark lenticellate; pods flat, 1- or 2-seeded).

The above collections suit well the original description of this species, which seems to be known only from the type-collection; the leaves tend to be a little more acuminate than those shown in the plate. The flowers are in bud: standard obovate-oblong, emarginate, 3.5 mm. long, 2 mm. broad, with a very short claw; wings and keel 3 mm. long, short unguiculate; stamens 10, in one sheath split on the upper side; ovary stipitate, sparsely pilose along the sutures, style short, ovules 2. *Dalbergia papuana* Pulle appears to be a close ally.

***Dalbergia novo-guineensis* sp. nov.**

Frutex magnus; ramulis brunnescentibus striatis crispe puberulis; stipulis minutis pubescentibus mox caducis; foliis 3-4 cm. longis imparipinnatis; petiolo 5-7 mm. et rhachi $\pm$ 2 cm. longis parce crispe pubescentibus; foliolis 7-jugis suboppositis vel subalternis oblongis 7-11 cm. longis, 2-3.5 cm. latis, apice obtusis basi rotundato-cuneatis interdum paullo inaequilateralibus utrinque glabris vel subtus costa margineque brevissime pilosis costa excepta inconspicue venosis; petiolulis 0.5 mm. longis; inflorescentiis brevissimis cum floribus 5 mm. longis, cum fructibus 1.5 cm. longis, axillaribus cymosis, axi pubescente; floribus basi bibracteatis, bracteis 0.5 mm. longis caducis; calyce, lobo postico subcarinato puberulo excepto, glabro 2 mm. longo, ceteris lobis rotundatis; vexillo obovato-oblongo 3 mm. longo, 2.5 mm. lato, basi cuneato vix unguiculato apice emarginato; alis carinaque 2.5 mm. longis breviter unguiculatis; staminibus 10 connatis, tubo latere antico fisso, antheris parvis; ovario brevissime stipitato 1.5 mm. longo 2-ovulato, stylo brevissimo; legumine 1.5 cm. longo, 0.7 cm. lato, basi cuneato stipitato glabro venoso.

BRITISH NEW GUINEA: Vailala River, Maira, *Brass* 1031 (TYPE), February 1926, overhanging the river (large bush with dark green pinnate leaves and flat green pods).

The species clearly belongs to the section *Sissoa*, but we cannot at present suggest any species which closely resembles it. Its chief characters are the small glabrous leaves, the very short inflorescence, and the small veined pods; the latter, however, are immature.

***Dalbergia rivularis* sp. nov.**

Scandens; ramulis atro-fuscis striatis glabris novellis tantum crispe pubescentibus; stipulis caducis; foliis 6-8 cm. longis impari-pinnatis; petiolo $\pm$ 1 cm. et rhachi 4-6 cm. longis crispule pubescentibus; foliolis 7-8-jugis suboppositis vel alternis late oblongis, 5-16 mm. longis, 3-8 mm. latis, proximalibus quam distalibus minoribus basi rotundatis inaequilateralibus apice paullo retusis vel truncatis supra consperse pilosis subtus praecipue in costa pilosis, nervis costa excepta inconspicuis; petiolulis 1 mm. longis pubescentibus; inflorescentiis axillaribus circiter 1.5 cm. longis; floribus non visis; calyce 3 mm. longo, lobis anticis 1.5 mm. longis subrotundatis, lateralibus 1.5 mm. longis acutis, lobo postico 2.5 mm. longo lineari-oblongo pubescente; legumine juvenili subfalcato basim versum in suturis crispe piloso, maturo 5 cm. longo, 1.5 cm. lato, basi cuneato

stipitato apice rotundato apiculato, valde applanato inter semine leviter contracto supra semina valde reticulato; seminibus 1-3 reniformibus valde compressis brunnescentibus.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 14080 (TYPE), April 1939, alt. 50 m., common large liane in flooded rain-forest of river plains.

This species is closely allied to *Dalbergia ferruginea* Roxb., but it has smaller leaves, less copious inflorescence, and much sparser more crisped pubescence.

Dalbergia densa var. *australis* Prain, Ann. Roy. Bot. Gard. Calcutta **10**(1): 73. t. 54. 1904.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7751, September 1936, rain-forest (large profusely flowering canopy liane climbing by tendrillate branchlets; flowers white); Lower Fly River, east bank opposite Sturt Island, *Brass* 8042, 8088, October 1936, rain-forest, common on flood plains and river banks (profusely flowering large canopy climber; flowers white).

The leaflets are smaller and a few more to the leaf than in var. *typica* Prain, also the ovary is glabrous. Distribution according to Prain: Australia (Queensland and some islands).

Derris Loureiro

Derris elegans (Grah.) Benth. in Miq. Pl. Junghuhn. 252. 1852; Prain, Jour. As. Soc. Beng. **66**(2): 103. 1897; Merr. Enum. Philip. Fl. Pl. **2**: 299. 1923.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass* 13913, April 1939, alt. 50 m., occasional marginal climber in flood-plain of river forest (flowers white). BRITISH NEW GUINEA: (det. E. G. Baker), Lower Fly River, east bank opposite Sturt Island, *Brass* 8024, 8232, on muddy river banks and in *Erythrina* swamp forests (common large climber; flowers pale pink or white). SOLOMON ISLANDS: Bougainville: Karngu, Buin, *Kajewski* 2259, 2290, October 1930, alt. 50 m., climbing well into the tops of rain-forest trees (vine with pendent racemes; flowers white. Vine used for lashing native houses). San Cristobal: Magoha River, *Brass* 2723, August 1932, lowland rain-forest, on swampy lands, common (very large liane with a profusion of sweet-scented white flowers). Malaysia.

Derris Koolgibberah F. M. Bail. Rep. Bellenden-Ker Exped. 38. 1889; Queensl. Fl. **2**: 445. 1900.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8205, October 1936, climbing shrub on muddy river bank (det. E. G. Baker). Queensland.

Derris heptaphylla (L.) Merr. Interpret. Herb. Amboin. 273. 1917; Enum. Philip. Fl. Pl. **2**: 299. 1923.

BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5768, January-March 1934, very plentiful on river banks and often partially submerged in water backed up by tides (large rambling shrub with erect stiff panicles of greenish flowers) (det. E. G. Baker). India and Malaysia.

Strongylodon Vogel

Strongylodon Archboldianus sp. nov.

Planta glabra scandens; ramulis striatulis; petiolo 3-5 cm. longo supra canaliculato, rhachi 1-1.5 cm. longo, petiolulis 2 mm. longis; stipellis petiolulis subaequalibus, stipulis 2.5-3 mm. longis ovatis plurinerviis; foliolis chartaceis vel subcoriaceis ovatis vel oblongo-lanceolatis 4-11 cm. longis, 1.5-5 cm. latis, lateralibus inaequilateralibus basi rotundato-cuneatis

apice obtuse acuminatis, acumine 1–1.5 cm. longo, e basi trinervatis, nervis lateralibus e costa irregulariter ortis utrinsecus 4 vel 5 utrinque perspicuis, reticulo utrinque prominulo; racemis axillaribus 8.5–21 cm. longis; pedunculo 4.5–5 cm. longo, nodis plerumque flores 3 gerentibus, rhachi puberula; bracteis 1–1.5 mm. longis nervatis; pedicellis $\pm$ 1 cm. longis glabris apice bibracteolatis, bracteolis obtusis; calycis tubo 6 mm. longo, lobis brevibus obtusiusculis; vexillo oblongo-lanceolato usque 2.8 cm. longo, 1.4 cm. lato, apice retuso basi unguiculato, ungui 4 mm. longo, alis usque 2 cm. longis, 5 mm. latis, ungui 6 mm. longo, carina 2.5 cm. longa; ovario 5 mm. longo, $\pm$ 9-ovulato, superiore margine puberulo, stipite 5 mm. longo; legumine cultriformi usque 12 cm. longo, 3 cm. lato, stipite 1 cm. longo, valvis coriaceis conspicue reticulatis margine superiore fere rectis inferiore leviter incurvis; seminibus 6 $\pm$ compressis brunnescentibus.

NETHERLANDS NEW GUINEA: southern slopes of Grand Valley, *Brass* 9522, August 1938, alt. 2350 m.; 9 km. northeast of Lake Habbema, *Brass* 10755, 10881, October 1938, alt. 2700 m. and 2650 m., rain-forest of valley bottom, common in small openings and along streams; Bele River, 18 km. northeast of Lake Habbema, *Brass* 11429 (TYPE), November 1938, alt. 2200 m., common on forested banks of river; Balim River, *Brass* 11696, December 1938, alt. 1600 m., climbing on woody growths fringing a stream. A slender climber ascending to 2–3 m.; flowers orange-red.

Strongylodon Archboldianus is a possible ally of *S. pulcher* C. B. Rob. of the Philippines, but the latter has different colored flowers, a pubescent calyx, and larger leaves with more numerous veins. The species is amply distinct from the rather widespread *S. lucidus* Seem. in the foliar and fruiting characters, the latter having broader leaflets, and a shorter broader pod with one or two seeds.

Mucuna Adanson

***Mucuna Baileyana* sp. nov.**

Planta magna scandens; ramulis petiolis rhachibus petiolulisque lutescenti-tomentosis demum glabratis; petiolo 5 cm. et rhachi 2.5 cm. petiolulisque 5 mm. longis, stipellis subulatis 4 mm. longis; foliolis suborbicularibus vel late ellipticis, 7–9 cm. longis, 5.5–8 cm. latis, basi rotundatis vel emarginatis lateralibus obliquis apice obtusiusculis, supra parce pubescentibus subtus breviter adpresse villosis vel subtomentosis, costa supra manifesta subtus prominula, venis primariis utrinsecus $\pm$ 6 supra manifestis subtus prominulis; inflorescentiis axillaribus $\pm$ 10 cm. longis racemosis subcorymbosis, pedunculo rhachi pedicellisque breviter tomentosis, pedunculo manifesto $\pm$ 5 cm. et rhachi $\pm$ 1 cm. pedicellisque 2 cm. longis; calyce dense pubescente et pilis urentibus hispido, tubo 6 mm. longo, lobo superiore emarginato 7 mm. longo, 5–6 mm. lato, lateralibus acutis 8 mm. longis, infimo lanceolato 9 mm. longo, 4 mm. lato acuminato; petalis viridescenti-albidis, vexillo obovato 2 cm. longo, 1.3 cm. lato, alis 2.5–3 cm. longis, basim versus margine inferiore barbatis, auriculis pubescentibus, carina 2.5 cm. longa; legumine circiter 15 cm. longo, 3.5 cm. lato alatas suturas 5 mm. includente, valvis oblique transversim lamellatis, lamellis 3–4 mm. latis; seminibus 5 compressis fuscis, 1.8 cm. longis, 1.4 cm. latis, 0.7 cm. crassis.

BRITISH NEW GUINEA: Vailala River, Ihu, *Brass* 1104 (TYPE), March 1926, common on banks of rivers (large climber, the whole plant pubescent; scattered bristly hairs on calyx; petals greenish white; pods covered with sharp easily detached bristles).

This is probably *Mucuna urens* var. *papuana* F. M. Bail. Queensl. Agric. Jour. **24**: 20. 1910, although the lobes of the calyx are at least twice as long as those described by Bailey, and the pod is a little larger. We do not believe it to be closely related to *M. urens* DC., an American species. It may be allied to *M. Stanleyi* C. T. White, but the flowers are smaller and the pubescence is finer.

***Mucuna discolor* sp. nov.**

Scandens; ramulis petiolisque glabrescentibus; petiolo $\pm$ 4 cm. longo, petiolulis 6 mm. longis adpresse pubescentibus; foliolis ovatis $\pm$ 7 cm. longis, 4.5–5 cm. latis basi rotundatis lateralibus obliquis apice acutis cuspidatis, supra glabris vel consperse pilosis subtus adpresse pubescentibus, costa supra manifesta subtus prominula, venis primariis utrinsecus 4–5 supra manifestis subtus prominulis; inflorescentiis axillaribus paniculatis subcorymbosis, pedunculo ramis pedicellis adpresse pubescentibus, pedunculo usque 2.5 cm. ramis 5 mm. pedicellis $\pm$ 1.5 cm. longis; calyce adpresse pubescente et pilis urentibus hispido, tubo 5 mm. longo late campanulato, lobo superiore 3 mm. longo emarginato, lateralibus 4 mm. longis acutis, infimo lineari-lanceolato 6–7 mm. longo acuminato; vexillo 1.5 cm. longo, alis 2 cm. longis, basim versus margine inferiore barbatis; carina 1.7 cm. longa abrupte apicem versus flexa; legumine ignoto.

BRITISH NEW GUINEA: Ononge Road, Dieni, *Brass* 3901 (TYPE), April–May 1933, climbing on roadside regrowth bushes (leaves purple beneath; hairs on calyx brown; flowers cream-colored with a greenish tinge).

The short inflorescence suggests *Mucuna Lane-Poolei* Summerh., but the leaflets are not long caudate-acuminate. The flowers are a little smaller than those of *M. cyanosperma* K. Schum., but in that species the inflorescence has a peduncle 14–18 cm. long, and the leaves are much larger.

Mucuna brachycarpa Rechinger, Denkschr. Math.-Nat. Kl. Akad. Wiss. Wien **89**: 562. 1913.

SOLOMON ISLANDS: Florida (N'Gela): northern end of island, *Brass* 3514, July 1933, alt. 75 m., hill rain-forests (climbing to tops of trees; dark glabrous leaves; calyx covered with brown hairs; corolla greenish, with numerous black specks and occasional blotches of red; only scanty fruiting material available).

In determining this collection we have the choice of assigning it to Rechinger's species or of describing it as new. The original description is wholly inadequate for determinative purposes; apparently the type consists of a stray 2-seeded *Mucuna* pod from Kieta, Bougainville; no dimension is indicated except that of the narrow wings. On account of geographic proximity and two almost unsupported fruit-characters (the scarcely prominent but obvious lamellae and the black seeds), we have assigned the collection to Rechinger's species and here append a brief description of our specimen:

Leaves $\pm$ 15 cm. long; leaflets glabrous or sparsely hairy along the midrib beneath, 5–8 cm. long, 2.9–4 cm. broad, ovate-oblong, apex short and obtusely acuminate, base rounded, the lateral oblique, primary nerves 4 or 5 on either side of the midrib; petiole $\pm$ 5 cm. long, rhachis 1.5 cm., petiolules 5–6 mm. long, stipels subulate; inflorescence apparently on older branches, paniculate, branches on the upper third or fourth of the greyish

pubescent axis, pedicels (1 cm. long) and ultimate branchlets atrofuscos velvety-pubescent; subtending bracts deciduous, broadly lanceolate, 2 cm. long, 0.6 cm. wide, atrofuscos velvety-pubescent; calyx velvety-pubescent with numerous rigid stramineous stinging hairs 2 mm. long, tube 5–6 mm. long, campanulate (in older flowers widely so), teeth triangular, the upper broad obtusish or slightly bilobed, the lateral and lower (4 mm. long) acute or acuminate; corolla 2.5 cm. long, standard 1.5 cm. long, 1 cm. broad, wings 5 mm. wide pubescent on the lower margin towards the base also in the region of the auricles, keel 2.5 cm. long abruptly bent about 1 cm. from the apex; pod (rather old and worn) 8–9 cm. long, scarcely 3 cm. wide, plaits distinct, seeds 3, black or mottled fuscous, $\pm$ 1.5 cm. diameter, somewhat compressed, 1 cm. thick.

***Mucuna elegans* sp. nov.**

Scandens inflorescentiis foliisque novellis exceptis glaber; petiolo 11–13 cm. et rhachi 2.5–3 cm. petiolulisque 1 cm. longis; stipulis stipellis non visis; foliolis ellipticis vel ovato-ellipticis, 11–13 cm. longis, 6–7 cm. latis, basi subrotundatis vel rotundato-cuneatis lateralibus obliquis apice abrupte anguste acuminatis, acumine $\pm$ 1 cm. longo basi 5 mm. lato, glabris vel novellis subtus consperse pilosis, nervis primariis utrinsecus 3–4 supra manifestis subtus prominulis, reticulo interdum manifesto; inflorescentiis subpaniculatis lateralibus solitariis vel subfasciculatis fere a basi ramosis, rhachi brevi $\pm$ 2.5 cm. et ramis 3–5 mm. pedicellisque 3 cm. longis adpresse pubescentibus, calyce dense pubescente et pilis urentibus hispido, tubo 6 mm. longo late campanulato vel cupuliformi, lobo superiore fere nullo, lobis lateralibus 2 mm. longis acutis, lobo infimo 4–5 mm. longo lanceolato acuminato; petalis coccineis, vexillo 3.5 cm. longo, 2.5 cm. lato, alis 5.5 cm. longis basim versus margine inferiore barbatis, auriculis pubescentibus, carina $\pm$ 6 cm. longa; legumine non viso.

SOLOMON ISLANDS: San Cristobal: Magoha River, *Brass* 2734 (TYPE), August 1932, littoral rain-forest, rare (magnificent climber displaying numerous festoons of large — about 6 cm. long — bright scarlet flowers in short clustered racemes below the pale green leaves).

The short inflorescence below the leaves suggests *Mucuna Bennettii* F. v. Muell., but the latter has prominent calyx-lobes. Another possible relative is *M. miniata* Merr. of Amboina. The latter has flowers very much like this species, but the wings are more pubescent, the rhachis of the inflorescence is much longer, the leaflets are slightly narrower, and the flowers appear before the leaves.

Canavalia De Candolle

***Canavalia papuana* sp. nov.**

Scandens; ramulis glabris vel nodis parce pubescentibus; petiolo 4–10 cm. longo supra canaliculato, rhachi 2–4 cm. longa, petiolulis 3–5 mm. longis minute pubescentibus, stipulis stipellis caducis; foliolis membranaceis ovato-ellipticis 10–13 cm. longis, 5–8 cm. latis, lateralibus basi subrotundatis obliquis (foliolo terminali breviter cuneato-rotundato) apice acutiusculis vel breviter obtuseque acuminatis apiculatis glabris; costa nervisque primariis utrinsecus $\pm$ 7 supra manifestis subtus prominulis, reticulo utrinque manifesto; inflorescentiis axillaribus racemosis 12–20-floris, pedunculo 10–14 cm. longo, rhachi subaequali puberula, nodis crassis,

pedicellis $\pm$ 2 cm. longis; bracteolis non visis; calyce campanulato consperse breviter pubescente, tubo 5 mm. longo, lobo supero vix 3 mm. longo late rotundato emarginato, lobis inferis 3 brevibus triangularibus acutiusculis; vexillo $\pm$ 2 cm. longo unguiculato, ungui 5 mm. longo, alis circiter 2 cm. longis, 3–4 mm. latis, carina incurva obtusa; legumine minute pubescente oblongo $\pm$ 8 cm. longo, 1.8–2 cm. lato, sutura dorsali tricarinata; seminibus 5–6 immaturis.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7730 (TYPE), September 1936, climbing over low second growths.

This species is unquestionably allied to *Canavalia luzonica* Piper, but the flowers are smaller and the pods are shorter, although those of the type are not yet mature. The two longitudinal ridges are very close to the dorsal suture.

DATISCACEAE

Tetrameles R. Brown

Tetrameles nudiflora R. Br. in Benn. Pl. Jav. Rar. 17, *t.* 17. 1838–1852; Koord. & Val. Mededeel. Lands Plant. 61: 37 (Bijdr. Boomsoort. Jav. 9: 37). 1903; Atl. Baumart. Jav. 1: *f.* 71. 1913.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8240, November 1936, rain-forest, plentiful on the drier ridges (very large deciduous tree; stem heavily buttressed and producing large spreading surface roots; bark very thick, smooth, grey, lenticellate; flowers green; leaves not seen). India to the Celebes.

This collection consists only of staminate panicles, but the flowers are a good match for the δ material of this species in our herbarium, and the description of the tree corresponds so well with that of the original that we believe the collection must belong to *Tetrameles nudiflora* R. Br., representing a genus not previously reported for New Guinea.

HALORAGACEAE

Haloragis J. R. & G. Forster

Haloragis chinensis (Lour.) Merr. Trans. Amer. Philos. Soc. II. 24(2): 290. 1935.
Gaura chinensis Lour. Fl. Cochinch. 225. 1790.
Goniocarpus scaber Koenig in Koenig & Sims Ann. Bot. 1: 547, *t.* 12, *f.* 6. 1805.
Haloragis scabra Benth. Fl. Hongk. 139. 1861.
Haloragis scabra var. *elongata* Schindler, Pflanzenr. 23(IV. 225): 29. 1905.

NETHERLANDS NEW GUINEA: Balim River, *Brass* 11629, December 1938, alt. 1600 m., deforested slopes, common on sandy soil (flowers red). BRITISH NEW GUINEA: Oriomo River, Wuroi, *Brass* 5855, January–March 1934, alt. 20 m., a few plants in a small tea-tree marsh on savanna (weak ascending scabrous herb).

This material, here recorded to call attention to the older specific name, agrees very well with the Chinese collections of this species.

Haloragis acanthocarpa Brongn. in Duperrey, Voy. *t.* 70. 1828; Benth. Fl. Austr. 2: 483. 1864; F. M. Bail. Queensl. Fl. 2: 555. 1900.

BRITISH NEW GUINEA: Wassi Kussa River, Tarara, *Brass* 8669, January 1937, poorly drained savanna forest, commonly surrounding termite mounds.

The fruit agrees better with the description of *Haloragis leptotheca* F. v. Muell. than with that of *H. acanthocarpa* Brongn.; however, since the two are accepted as synonymous, we see no reason for excluding the

collection from this species. The fruit, apart from the calyx-lobes crowning it, is narrowly oblong, 1.2 mm. long, 0.8 mm. broad, 8-ribbed, with 3 or 4 minute tubercles in a single row between each pair of ribs.

Haloragis nemorosa F. W. Went, Nov. Guin. 14: 107, *t. 11B*. 1924.

NETHERLANDS NEW GUINEA: Balim River, *Brass 11672*, December 1938, alt. 1700 m., common on grassy banks of stream (slender, erect or shortly scrambling shrub 1 m. or more high; flowers red).

This collection is a close match for the plate of this species. It differs in the following points from the original description: stem terete, subtomentose, angular only on the upper part; leaves scabrous above, beneath the hairs very short and minutely bulbous at the base (cf. Went's description of the upper surface of the leaves of *H. fruticosa*), trichomes longer and more crowded on the midrib; calyx-tube in younger leaves $\pm$ pubescent, in the older ones tending to have only the veins pubescent. This is mainly a difference in the amount of pubescence, and possibly in the quality, although allowance must be made for individual differences in definition; such differences could hardly be considered of specific value without a comparison with the actual type.

LOGANIACEAE

Geniostoma J. R. & G. Forster

Geniostoma Archboldianum sp. nov.

Arbuscula 2.5–7 m. alta; ramulis tetragonis 4-lineatis, novellis nigrescentibus dense puberulis demum glabris; foliis coriaceis opacis in sicco nigrescentibus ellipticis 1.8–4 cm. longis, 1–2.2 cm. latis, apice acutiusculis vel obtusiusculis basi breviter late cuneatis, costa supra subplana vel elevata subtus prominula, nervis primariis utrinsecus $\pm$ 6 patentiadscendentibus marginem versus arcuatis supra subobscuris subtus perspicue manifestis non elevatis, venulis indistinctis; stipulis novellis late ovatis cito marcescentibus vel deciduis; petiolo circiter 5 mm. longo glabro; floribus in foliorum axillis in cymis paucifloris circiter 5 mm., in fructu usque 10 mm. longas dispositis; pedicellis basim versus bracteatis; sepalis ovatis acutis 1 mm. longis basim versus connatis; corollae tubo circiter 1.5 mm. longo intus fere glabro (trichomis paucis prope filamenta), lobis 1–1.5 mm. longis intus glabris vel minutissime papillois; filamentis vix 0.5 mm. longis minute pilosis, antheris ovatis cordatis 1 mm. longis apice connectivo manifeste apiculatis, utrinque $\pm$ breviter pilosis; ovario depresso subgloboso 1 mm. longo, 1.5 mm. lato, glabro, stylo 0.4 mm. longo minute pubescente, stigmate globoso pubescente; fructibus ovoideis 5 mm. longis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11362* (TYPE), November 1938, alt. 2200 m., rain-forest, on bank of river (weak-tree 2.5 m. high; leaves dark green; flowers white; green dehiscent fruits with red seeds); same locality, *Brass 11533*, alt. 2400 m., forest substage (tree 7 m. high; flowers white); Balim River, *Brass 11750*, December 1938, alt. 1800 m., grassy long deforested slopes (small bushy tree; flowers white).

The distinctive floral characters are the size of the flower, the practically glabrous corolla, the pubescent and manifestly apiculate anthers. The latter character suggests an alliance with *Geniostoma antherotrichum* Gilg & Benedict, but the latter has much larger leaves and larger much more

elaborately branched inflorescences. In *G. Archboldianum* the veins of the corolla lobes are usually 3 or 5, the laterals running off from the midrib near the base and sometimes branching again near the tip. The species, in several characters, suggests *G. Pullei* Cammerl. but the leaves are shorter in proportion to the width and not acuminate, the pedicels are glabrous, the filaments are short, and the stigma is globose.

Geniostoma Gilgii nom. nov.

Geniostoma stenophyllum Gilg. & Benedict, Bot. Jahrb. **54**: 162. 1916, non Merr. (1912).

The species is not represented in our material.

Geniostoma Brassii sp. nov.

Arbuscula vel frutex glaber; ramis cinereis, ramulis brunnescentibus cito cinerascentibus compressis; foliis coriaceis in sicco atrofusces lanceolatis 6-9 cm. longis, 1.5-2.5 cm. latis, apice acuminatis basi anguste rotundatis vel late ac breviter cuneatis, costa supra impressa subtus prominente, nervis primariis utrinsecus $\pm$ 7 arcuatim adscendentibus supra interdum impressis subtus $\pm$ prominulis, reticulo obscuro; petiolo circiter 1 cm. longo; floribus in foliorum axillis in cymas 5-7-floras compactas circiter 1 cm. longas confertis; pedicellis $\pm$ 1.5 cm. longis; bracteis parvis; sepalis vix 2 mm. longis ovatis obtusis; corollae tubo 3 mm. longo intus faucem versus et ad faucem dense longiuscule piloso, lobis anguste ovatis 2.5 mm. longis obtusiusculis basim versus pilosis; filamentis brevissimis, antheris oblongo-ovatis 1.2-1.4 mm. longis apice minute apiculatis glabris; ovario subgloboso glabro, 1 mm. longo, stylo glabro 1 mm. longo, stigmate crasse clavato; fructibus ovoideis 8 mm. longis 5 mm. diametro.

SOLOMON ISLANDS: San Cristobal: Hinuahaoro, Brass 3024 (TYPE), September 1932, alt. 900 m., common in mountain rain-forests (slender virgate tree or small shrub).

A species superficially somewhat resembling *Geniostoma Cumingianum* Benth. of the Philippines and *G. rupestre* Forst. of Polynesia. It differs from both in the stiff (when dry) coriaceous leaves and the clavate stigma. The lateral veins of the lobes of the corolla arise with the midrib at the base of the tube and branch dichotomously, the point of branching is concealed beneath the pilosity in the throat of the tube and the base of the corolla lobes.

Geniostoma Randianum sp. nov.

Arbuscula vel frutex 2-4 m. altus glaber; ramulis tetragonis novellis brunnescentibus demum cinereis; foliis coriaceis in sicco atro-viridescens subtus pallidioribus, oblongis 2.5-4 cm. longis, 0.8-2 cm. latis, utrinque aequaliter angustatis apice apiculatis, apiculo interdum $\pm$ pubescente, costa supra plana vel leviter elevata subtus prominente, nervis primariis utrinsecus $\pm$ 6 patenti-adscendentibus marginem versus arcuatis supra insculptis subtus prominulis, reticulo utrinque manifesto; stipulis triangularibus apiculatis; petiolo circiter 5 mm. longo basi bulboso; floribus in foliorum axillis solitariis vel in cymis depauperatis dispositis; sepalis 1.5 mm. longis ovatis acutis basim versus connatis; corollae tubo 4 mm. longis extus glabro intus faucem versus consperse breviter piloso, lobis ovatis 3 mm. longis acutiusculis glabris; filamentis vix 1 mm. longis pilosis, antheris

ovatis apice connectivo minute apiculatis breviter pilosis; ovario globoso 2 mm. diametro, stylo 2 mm. longo glabro, stigmatе pubescente; fructibus in specimine typico immaturis oblongo-ovoideis 1.4 mm. longis.

BRITISH NEW GUINEA: Wharton Range, Murray Pass, *Brass* 4522 (TYPE), June–September 1933, alt. 2840 m., common in forest fringes (small tree or large bush 2–4 m. tall; leaves thick, shining, yellowish beneath; flowers green; fruit dark green).

Only in the pilose anthers the species shows a similarity to *Geniostoma antherotrichum* Gilg & Benedict. Its best characters are the 4-angled branchlets, the small oblong leaves, the relatively large flowers with pilose anthers, and the fairly large fruit. The lateral veins of the corolla lobes are usually twice dichotomously branched.

***Geniostoma obtusum* sp. nov.**

Frutex circiter 2 m. altus glaberrimus; ramulis tetragonis 4-lineatis novellis brunnescentibus cito cinereis; foliis coriaceis opacis supra rugosis in sicco nigrescentibus subtus pallidioribus obovato-ellipticis 2.5–5 cm. longis, 1.5–2.8 cm. latis apice rotundatis saepe minute apiculatis basi cuneatis, costa utrinque $\pm$ elevata, nervis primariis utrinsecus $\pm$ 6 arcuato-adscendentibus supra insculptis subtus prominulis, reticulo laxo supra impresso subtus manifeste vix prominulo; stipulis triangularibus apice acutis; petiolo 5–8 mm. longo basi bulboso; floribus in foliorum axillis solitariis vel binis pseudofasciculatis; pedicellis basim versus bracteatis; sepalis late ovatis acutiusculis 1.5 mm. longis in parte $\frac{1}{4}$ inferiore connatis; corollae tubo campanulato extus glabro intus faucem versus breviter piloso 4 mm. longo, lobis 3 mm. longis ovatis acutiusculis basi pilosis; staminibus ad faucem insertis, filamentis subnullis, antheris ovato-ellipticis 1.5 mm. longis apice connectivo manifeste appendiculatis breviter pilosis; ovario globoso glabro, stylo 2 mm. longo glabro, stigmatе subgloboso parce pubescente vel fere glabro; valvis fructus 2 cm. longis 1 cm. latis.

BRITISH NEW GUINEA: Mount Tafa, *Brass* 4995 (TYPE), May–September 1933, alt. 2400 m., debris of an old landslip (bush about 2 m. tall; flowers pale green; dark green fruit).

This species is closely related to *Geniostoma Randianum* Merr. & Perry. It differs chiefly in the obovate leaves. There is a slight difference in the pubescence in the throat of the corolla, and the stigma is practically glabrous.

***Mitrasacme* Labillardière**

***Mitrasacme alsinoides* R. Br. Prodr. 453. 1810.**

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7826, September 1936, plentiful on wet grass plains (flowers white).

Apparently this is a new record for New Guinea, although the plant has been reported from Australia and also from Malaysia. This species-name and *M. indica* Wight have been considered synonyms by some authors. We have not material available to settle the question. In this material the throat is shortly bearded, a character not mentioned in the original description.

***Couthovia* A. Gray**

***Couthovia novo-britannica* Kaneh. & Hatus. Bot. Mag. Tokyo 53: 9. 1939.**

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski* 1679, April

1930, alt. 950 m., rain-forest; Koniguru, Buin, *Kajewski* 2010, August 1930, alt. 800 m., rain-forest (tree up to 20 m. high, fruit white). *Y s a b e l*: Tiratona, *Brass* 3408, December 1932, alt. 600 m., rain-forest (small tree with brown slightly flaky bark). *G a u d a l c a n a l*: Uulolo, Tutuve Mountain, *Kajewski* 2548, April 1931, alt. 1200 m., rain-forest.

Although, in the original description, the tube of the corolla below the throat is described as glabrous within, we find in the buds of a co-type that there are small fascicles of hairs between the short filaments and that very few, if any, hairs are attached to the base of the anthers. That is, according to our interpretation, the anthers are glabrous or practically so. These characters hold in the specimens cited above, and with the material at hand we are unable to distinguish them from Kanehira and Hatusima's species. Without examination of the type of *Couthovia brachyura* Gilg & Benedict, we are not in a position either to confirm or to deny the inference in the discussion of *C. novo-britannica* Kaneh. & Hatus. that *C. Brassii* S. Moore is most probably identical with *C. brachyura* Gilg. & Bened. We would suggest, however, that the isotype of *C. Brassii* S. Moore does not correspond with the original description of Gilg & Benedict's species.

***Couthovia macrophylla* sp. nov.**

Arbor usque 20 m. alta; ramulis angulatis levibus; foliis chartaceis petiolatis, petiolo 1.5–2.5 cm. longo, stipulis interpetiolaribus usque $\frac{1}{2}$ petiolo adnatis chartaceis vel subcoriaceis profunde fissis 0.7–2 cm. longis partibus triangularibus acutis persistentibus; lamina elliptica vel subrotundata, 18–27 cm. longa et 12–24 cm. lata, apice rotundata basi rotundata deinde abrupte breviter cuneata, costa supra canaliculata subtus prominente, nervis lateralibus utrinsecus 10–12 patenti-adscendentibus utrinque prominulis, venis laxe reticulatis; floribus in apice ramorum in subcorymbum multiflorum cymosum confertis, cymis circiter 4–plo divisis, pedunculis 12–14 cm. longis, ramis primariis $\pm$ 8 cm. longis secundariis atque tertiariis valde diminutis omnibus dense minuteque pubescentibus; pedicellis brevissimis; sepalis rotundatis pubescentibus ciliatis basi in brevem tubum connatis; corolla extus puberula, tubo cylindraceo 3 mm. longo, intus in parte intermedia inter antheras dense fasciculatim piloso, lobis ovatis acutis 1.5 mm. longis, fauce densissime pilosa; staminibus in parte $\frac{1}{3}$ inferiore insertis, filamentis 1.5 mm. longis, antheris anguste ovatis 1.5 mm. longis glabris; ovario ovoideo sursum in stylum attenuato capitato; fructu elongate conico 2 cm. longo 1 cm. diametro deinde in stipitem $\pm$ 7 mm. longum 4 mm. latum abrupte constricto.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5815, common on banks of tidal backwater river (large bush or small open tree; fruit fibrous, orange-red); Lower Fly River, east bank opposite Sturt Island, *Brass* 8007 (TYPE), October 1936, abundant in poorly developed forest on some flood-plains (tree with small crown and pale fibrous flaky bark, attaining 20 m.; stem flanged or fluted; leaf-nerves pale; flowers white).

This species shows considerable likeness to *Couthovia celebica* Koord. In that, however, the corolla tube, except the villous throat, is described as glabrous within, although the plate, Suppl. 1, Fl. N. O. Celebes, t.2. 1918, would seem to indicate that the corolla is pubescent between the bases of the filaments as it is in our species. Unfortunately, in the two

collections we have from the Celebes the flowers are only in young bud. The fruit of the New Guinean material is much more elongate than that in the Philippine collections of *C. celebica* Koord. Until much more material is available to show variations we think it preferable to regard these as two distinct but closely related species.

***Couthovia leucocarpa* sp. nov.**

Arbor 23–41 m. alta; ramulis subteretibus fuscis levibus; foliis subcoriaceis petiolatis, petiolo 1–1.5(2) cm. longo, stipulis interpetiolaribus obovoideis obtusis plerumque longitudinaliter profunde fissis; lamina elliptica, 7–13 cm. longa et 4–8 cm. lata, utrinque angustata apice obtusiuscula vel interdum rotundata basi breviter cuneata, costa supra subplana subtus prominente, nervis lateralibus utrinsecus $\pm$ 5 utrinque prominulis subadscendentibus, venis laxe reticulatis obscuris; floribus in apice ramorum in corymbum multiflorum densum confertis, pedunculis 1–1.5 cm. longis cymae ramis primariis 3–4 cm. longis secundariis atque tertiariis valde diminutis consperse puberulis; pedicellis nullis vel subnullis; bracteis minimis puberulis; sepalis 2 mm. longis suborbicularibus margine ciliolatis; corollae tubo cylindraceo 3 mm. longo, lobis ovatis acutis 1 mm. longis, fauce dense pilosa, tubo ceterum intus glabro vel in parte intermedia inter antheras parce pubescente; staminibus in medio tubo insertis, filamentis brevissimis, antheris anguste ovatis basi manifeste barbatis, ovario ovoideo sursum in stylum tenuem attenuato, stigmatе capitato; fructu figura triangulo-ovoideo 1.5 cm. longo, 1.8 cm. lato, basi in stipitem obconicum 0.7 cm. longum totidem latum abrupte constricto.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13116* (TYPE), March 1939, alt. 850 m., occasional in rain-forest of plain (tree 23 m. high, 40 cm. diameter; flowers white; ripe fruit white); 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13517*, March 1939, alt. 750 m. (tree 41 m. high, 72 cm. diameter; flowers white, ripe fruit white); Bernhard Camp, Idenburg River, *Brass & Versteegh 13593*, April 1939, alt. 350 m. (tree 31 m. high, 66 cm. diameter; fruits green).

This species suggests *Couthovia terminalioides* Gilg & Bened. in floral characters, but the latter has rather larger leaves and fruit gradually long-attenuate at the apex.

***Fagraea* Thunberg**

***Fagraea Archboldiana* sp. nov.**

Arbor 5 m. alta; ramulis novellis viridescentibus demum pallide cinereis; foliis petiolatis, petiolo 1.5–2 cm. longo, basi stipulis in laminulam intra-petiolarem retusam pulviniformem connatis aucto; lamina 9–14 cm. longa, 3–5 cm. lata, obovato-oblonga vel oblanceolata basi longe cuneata apice subabrupte acuta vel breviter acuminata, costa basim versus laminae utrinque prominente, nervis lateralibus utrinsecus $\pm$ 6 obscuris; inflorescentiis 3- vel 5-floris; bracteis infimis foliiformibus, pedunculis vel pedicellis 1–2.5 cm. longis; bracteolis 2 ovatis obtusis circiter 2 cm. longis basi connatis coriaceis margine membranaceis concavis lateraliter compressiusculis; calycis tubo 1 cm. longo, lobis 1.5–2 cm. longis rotundatis margine membranaceis; corollae tubo 3.5–4 cm. longo infundibuliformi intus calycem circiter 1 cm. sub lobis 2–2.5 cm. diametro, lobis late rotundatis 1.5 cm. longis, 1.8 cm. latis; staminibus circiter in tubo medio insertis; fila-

mentis $\pm$ 1.5 cm. longis, antheris 1 cm. longis, 4 mm. latis; stylo 3.5 cm. longo, stigmatе suborbiculari; fructibus obovoideis immaturis in sicco 3 cm. longis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass* 11343 (TYPE), November 1938, alt. 2300 m., Fagaceae forests, occasional in seral growths of forest openings (tree 5 m. high; flowers greenish yellow).

As far as we know, this is the only *Fagraea* as yet described from New Guinea with large coriaceous bracts embracing the base of the calyx. In some respects it suggests *F. obovata* Wall. but, in the collections at hand, that species has much smaller bracts and these do not particularly cover the base of the calyx. Two specimens from the Philippines, *Ramos* 30451, Cantanduanes, and *Wenzel* 936, Leyte, have these large bracts enclosing the lower part of the calyx and may be conspecific with our species.

Fagraea Cambagei Domin, *Bibl. Bot.* **22**(Heft 896): 1071. 1928.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7454, August 1936, common in bushy type of rain-forest (tree 10–12 m. tall; branches flat spreading; bark brown, hard, deeply furrowed and fissured; flowers cream; fruit white); Lower Fly River, east bank opposite Sturt Island, *Brass* 8097, October 1936, rain-forest, common on dry ridges (brushy substage tree 6–7 m. tall; flowers pale yellow; fruit smooth, white, up to $\pm$ 2.5 cm. diameter).

Although in these collections the inflorescence is terminal rather than lateral as given in the original description, the material is a fairly good match for collections so named from Queensland. It is certainly too close to the original description to be considered distinct without comparison with the actual type. The fruit is ovoid and shortly apiculate.

Fagraea elata sp. nov.

Arbor $\pm$ 28 m. alta; ramulis brunnescentibus; foliis coriaceis petiolatis, petiolo 2 cm. longo supra plano, basi stipulis in laminulam intrapetiolarem obtusam vix 5 mm. longam connatis aucto; lamina elliptica 8–13 cm. longa, 4–6.5 cm. lata, apice rotundata deinde abrupte brevissime (3–5 mm.) obtuse acuminata basi rotundato-cuneata, costa supra impressa subtus prominente, nervis lateralibus utrinsecus 6–8 supra insculptis subtus manifestis; floribus in apice ramorum in cymis paucifloris dispositis, cymae ramis $\pm$ 1 cm. longis; bracteis infimis foliiformibus circiter 2 cm. longis, 7 mm. latis, ceteris squamiformibus oblongis 3–4 mm. longis, rotundatis leviter compressis; pedicellis vix 1 cm. longis; floribus in alabastris tantum visis; calycis tubo vix 5 mm. longo, lobis circiter 6 mm. longis latisque rotundatis; corollae tubo immaturo; staminibus circiter in medio tubo insertis; fructibus vix maturis 3 cm. longis rostrum 1 cm. longum, 1.7 cm. diametro, includentibus, obovoideis apice subabrupte longe rostratis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 11975 (TYPE), January 1939, alt. 1530 m., rare on slopes of primary forest (tree 28 m. high, 36 cm. diameter; flower-buds green; fruit green); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh* 12533, February 1939, alt. 1200 m., frequent on slopes of primary forest (tree 29 m. high, 58 cm. diameter; flower-buds green; fruits orange-colored).

In the obvious primary veins of the leaves the species suggests *Fagraea dolichopoda* Gilg & Bened. The leaves of the latter, however, are very different in outline, being manifestly acuminate at the apex and narrowly

cuneate at the base. The fruits, too, are different. Closely allied and possibly belonging to this species is *Brass* 1418, Aisa River, Eastern Division, British New Guinea.

***Fagraea Bodenii* Wernh.** Trans. Linn. Soc. Bot. II. 9: 111. 1916.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh* 10453, *Brass* 10541, alt. 2800 m.; Bele River, 18 km. northeast of Lake Habbema, *Brass & Versteegh* 11113, alt. 2240 m.; Balim River, *Brass & Versteegh* 11191, alt. 2160 m.; 15 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12133, alt. 1800 m.; 6 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12744, alt. 1500 m. (epiphytic tree 6 m. high; flowers cream-colored; fruits orange).

These collections are relatively uniform. Frequent or occasional in mossy forest, a tree 15–20 m. high with white or cream-colored fragrant flowers and orange-colored fruits. The type should be compared with the original of *Fagraea suaveolens* Cammerl. The latter has slightly larger flowers than those in the collections cited; there is, nevertheless, a strong resemblance in the two descriptions. Wernham does not give the size of the flower in his species. Either identical or very closely related is: *Brass* 4084, alt. 2350 m., Mount Tafa, British New Guinea. Here the corolla tube is more campanulate than infundibular.

***Fagraea papuana* sp. nov.**

Arbor epiphytica circiter 10 m. alta; ramulis $\pm$ angulatis cinereis vel pallide brunnescentibus; foliis petiolatis, petiolo 1–2 cm. longo stipulis in laminulam intrapetiolaem obtusam 5–7 mm. longam connatis aucto; lamina obovato-oblonga 6–11 cm. longa, 3–5 cm. lata, apice abrupte obtuse breviter acuminata basi sensim cuneata, costa utrinque distincta, nervis lateralibus utrinsecus circiter 8–10 obscuris; floribus in apice ramorum in cymam plurifloram 2-plo divisam dispositis, cymae ramis 1–1.5 cm. longis; pedicellis $\pm$ 5 mm. longis; bracteis infimis circiter 2.5 cm. longis foliiformibus vix 5 mm. petiolatis, ceteris squamiformibus ovatis rotundatis 3–4 mm. longis; calyce circiter 6 mm. longo, lobis rotundatis 3 mm. longis; corollae tubo 2 cm. longo infundibulari supra calycem 3–4 mm. sub apice 5–7 mm. diametro, lobis late oblongis 1.5 cm. longis, 1 cm. latis; staminibus circiter 8 mm. supra basim corollae tubi insertis, filamentis $\pm$ 5 mm. longis, antheris 1 cm. longis; stylo incluso, stigmate bilobo; fructibus immaturis 2 cm. longis, 1 cm. latis, obovoideis apice breviter rostratis.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, *Brass* 6749 (TYPE), May 1936, alt. 80 m., ridge-forest (epiphyte in top of a canopy tree, $\pm$ 10 m. high; leaves somewhat fleshy with recurved tips; flowers cream-colored, fragrant).

This species suggests two species already described, *Fagraea calophylloides* Gilg & Bened. and *F. Bodenii* Wernh. The first has leaves with numerous or very numerous primary veins and, according to fig. 11 accompanying the original description, stamens inserted above the middle of the corolla tube. In our species the leaves show 8–10 pairs of primary veins in transmitted light, otherwise it is difficult to count them; the stamens are inserted on the lower 1/3 of the corolla tube. In *F. Bodenii* Wernh. the fruit is long-rostrate and the filaments are about twice as long as in *F. papuana*.

Fagraea obtusifolia sp. nov.

Arbor 20–30 m. alta; ramulis cinereis internodiis brevissimis; foliis coriaceis petiolatis; petiolo 2–3.5 cm. longo supra subplano basi dilatato; lamina suborbiculari vel late elliptica 6.5–12 cm. longa, 4–10 cm. lata, apice rotundata basi rotundata deinde abrupte cuneata, costa supra impressa subtus subprominente, nervis lateralibus utrinsecus 4–6 supra leviter insculptis subtus prominulis; inflorescentiis cymosis 2-plo divisis in fructu $\pm$ 3.5 cm. longis terminalibus atque in axillis foliorum superiorum; ramis cymae $\pm$ 5 mm. longis; floribus non visis; pedicellis 1–1.5 cm. longis basi bibracteatis, bracteis ovatis obtusis circiter 2 mm. longis; calycis tubo brevissimo, lobis subrotundatis patentibus 4–5 mm. longis latisque margine membranaceis; fructibus oblongis breviter apiculatis 1.5 cm. longis, 1 cm. diametro.

SOLOMON ISLANDS: Y s a b e l: Tataba, *Brass* 3444 (TYPE), January 1933, alt. 50 m., rain-forest ridges, common (handsome tree with spreading crown, 20–30 m. tall; thick rough rather fibrous bark and hard brown wood; very thick concave leaves yellow-green beneath; very smooth pale brown soft fleshy fruit).

We are unable to suggest a closely allied species. The almost orbicular long-petioled leaves, the short branches of the inflorescence, the long pedicels, the short inconspicuous calyx-tube, and the spreading lobes are the best characters of this rather distinctive species.

Fagraea aurantiodora S. Moore, Jour. Bot. **66**: 105. 1928; C. T. White, Jour. Arnold Arb. **10**: 259. 1929.

NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13472, March 1939, alt. 800 m., rain-forest (subsidiary tree 25 cm. diameter; flowers white; fruits orange).

This is a new record for Netherlands New Guinea. The species belongs to the subgenus *Cyrtophyllum* along with *F. elliptica* Roxb., *F. sumatrana* Miq., *F. fragrans* Roxb., and *F. sororia* J. J. Sm. The dried fruit is subglobose and about 4 mm. in diameter.

Fagraea salomonensis Gilg & Benedict, Bot. Jahrb. **56**: 554. 1921.

SOLOMON ISLANDS: B o u g a i n v i l l e: Kupei Gold Field, *Kajewski* 1688, April 1930, alt. 1000 m.; Koniguru, Buin, *Kajewski* 2041, August 1930, alt. 950 m. G u a d a l c a n a l: Uulolo, Tutuve Mountain, *Kajewski* 2522, April 1931, alt. 1200 m.; Sorvorhio Basin, *Kajewski* 2708, January 1930, alt. 150 m. S a n C r i s t o b a l: Hinuahaoro, *Brass* 2915, September 1932, alt. 900 m. Y s a b e l: Tiratona, *Brass* 3212, November 1932, alt. 600 m. Rain-forest. Tree sometimes epiphytic, sometimes terrestrial, with pale yellow heavily scented flowers and yellow or orange colored subglobose and shortly apiculate fruit $\pm$ 3.6 cm. long and 3 cm. diameter. Natives use fruit as a fly-trap, first removing the epicarp to expose the viscid mesocarp.

These collections agree reasonably well with the original description of *Fagraea salomonensis* Gilg & Bened. One of the Brass collections is in flower, the dimensions being only very little smaller than those of the original. The inflorescence is about 10 cm. long, subtended at the base by leaves and at the nodes by oblong or ovate obtuse bracts 8–4 mm. long; the stamens are inserted a little above the middle of the corolla-tube, and the anthers are linear, 1 cm. long, exserted at the tips only.

Neuburgia Blume

Although none of our material falls into *Neuburgia* Bl., to aid the next

worker to find the genus more easily, we here append this short note. Markgraf in "Die Apocynaceen von Neu-Guinea," Bot. Jahrb. 61: 222. 1927, transferred the genus from the Apocynaceae to the Loganiaceae. In a brief comment, he indicated that *Neuburgia tubiflora* Bl. is identical with *Crateriophytum moluccanum* Scheff., and that Blume's name is the older, hence valid. The type of the genus is *N. tubiflora* Bl. As for the other species included in the genus, *N. musculiformis* (Lam.) Miq. (*N. tuberculata* Bl.), we are uncertain as to its identity, but from Rumphius's description and plate, we are confident it does not belong to the genus *Neuburgia* Bl.

RUBIACEAE

Mastixiodendron Melchior

Mastixiodendron pachyclados (K. Schum.) Melchior, Bot. Jahrb. 60: 168, t. 1. 1925; C. T. White, Jour. Arnold Arb. 10: 257. 1929.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh* 13548, April 1939, alt. 120 m., occasional in primary forest, on slope of ridge (tree 31 m. high, 45 cm. diameter; bark black, scaly; fruit green); same locality, *Brass* 14007, April 1939, alt. 50 m., rain-forest of river plains, subject to occasional inundations, sometimes in almost pure stands $\pm$ 30 m. high but of limited extent; stem with small plank-buttresses; bark brown, lenticellate; wood yellowish; leaf margins recurved below the middle; flowers green; fruit unripe).

In the sight determinations, these collections were placed in the Loganiaceae, probably on account of the pubescence or long yellow papillae on the inside of the corolla-lobes. However, on working over the Loganiaceae, we find the material undoubtedly belongs to *Mastixiodendron* Melch., established as a genus of the Cornaceae. This we sent to Dr. I. W. Bailey for a check. He replied, "Although Melchior studied the structure of the leaves and stem, he failed to recognize that the structure of these organs excludes the plant from the Cornaceae. *Mastixiodendron* is clearly rubiaceous." The genus is very closely related to *Dorisia* Gillespie in Hook. Ic. Pl. 32: t. 3190. 1933, first placed in the Cornaceae, but later removed to the Rubiaceae by Dr. A. C. Smith; for discussion, see Bishop Mus. Bull. 141: 140, 141. 1936.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

STUDIES OF PAPUASIAN PLANTS, V*

A. C. SMITH

THE present paper primarily contains a discussion of the Winteraceae of New Guinea and the Solomon Islands, while brief notes on two genera of Magnoliaceae and two genera of Monimiaceae (supplementary to the treatment in Jour. Arnold Arb. **22**: 231–252. 1941) are added. When no place of deposit is cited for specimens, they have been seen only in the herbarium of the Arnold Arboretum; otherwise the place of deposit is indicated by: (A) Arnold Arboretum, (NY) New York Botanical Garden.

WINTERACEAE

The Winteraceae is now usually accepted as distinct from the Magnoliaceae, with which earlier taxonomists combined it. Morphological and anatomical studies show that the two families are entirely distinct. Prof. I. W. Bailey has for many years been assembling data on the interrelationships of the families of woody Ranales, and papers discussing some of these families are now in preparation. Many botanists who have worked with the winteraceous genera have declined to accept the pioneer work of van Tieghem (in Jour. de Bot. **14**: 275–297, 330–355. 1900), who defined the family as consisting of six genera, excluding *Illicium* L. Hutchinson (in Kew Bull. **1921**: 185–191. 1921), in discussing the Winteraceae, included *Illicium* but otherwise accepted van Tieghem's delimitations. Our preliminary studies convince us that most, if not all, of van Tieghem's genera are well-founded. An amplification of the relationships of these genera is being prepared, and the purpose of the present treatment is to record the novelties which have been discovered in Papuasia by recent collectors. In our region three genera of the Winteraceae occur, *Drimys* and *Bubbia* in New Guinea and *Belliolum* in the Solomon Islands.

DRIMYS J. R. & G. Forst.

In the only comprehensive work on this group of plants in New Guinea, Diels (in Bot. Jahrb. **54**: 240–245. 1916) used the name *Drimys* in its broader sense, to include species of *Bubbia*. He recognized six species of *Drimys* proper from New Guinea. In the same year, Ridley (in Trans. Linn. Soc. II. Bot. **9**: 11–13. 1916) proposed eight species of *Drimys*, of which all except one fall into the narrower concept of the genus. More recently, Pulle, Diels, and Gibbs have each described additional species, and at the present time 23 names of New Guinean species have been proposed which are referable to *Drimys* in the restricted sense (excluding *Bubbia*). Examination of the descriptions of these species indicates that

* Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **22**: 497–528. 1941.

most of them are very distinct. The rapid growth of the number of species of *Drimys* recognized from New Guinea is due entirely to recent explorations in the higher mountains, and I am convinced that reductions to synonymy will not be extensive, although of course some changes in the nomenclatural status of various entities will be inevitable as our knowledge of the region increases. The collections now under study make necessary the description of six new species, all obtained by Mr. L. J. Brass.

***Drimys microphylla* sp. nov.**

Frutex dioicus (vel polygamo-dioicus?) epiphyticus multiramosus 1–2 m. altus ubique glaber, ramulis gracilibus apicem versus leviter angulatis demum subteretibus et cinereis; foliorum parvorum petiolis gracilibus 1–2 mm. longis, laminis subcoriaceis in sicco fuscis elliptico-obovatis, (5–)6–10 mm. longis, (2–)3–5 mm. latis, basi gradatim angustatis, apice rotundatis, margine leviter recurvatis, costa supra subplana vel leviter impressa subtus elevata, nervis lateralibus ut videtur utrinsecus 3 vel 4 obscuris immersis; floribus ♂ axillaribus apicem ramulorum versus solitariis, pedicellis gracilibus sub anthesi 4–6 mm. longis; sepalis 2 calyptratis membranaceis obscure pellucido-glandulosis circiter 2 mm. longis mox caducis; petalis 4–6 submembranaceis lineari-oblongis vel anguste obovatis, 4–5 mm. longis, 0.8–1.2 mm. latis, apice obtusis vel subacutis; staminibus 14–18 toro parvo subconico congestis et plerumque 3-seriatis, 1–2 mm. longis (exterioribus quam interioribus conspicue brevioribus), filamentis basi et apice leviter contractis, apicem versus obscure glandulosis, loculis oblique terminalibus circiter 0.35 mm. longis longitudinaliter dehiscentibus; carpellis sterilibus plerumque solitariis raro 2 interdum nullis, quam staminibus brevioribus, ellipsoideis, compressis; fructu maturitate unicarpellato subcarnoso ellipsoideo, circiter 6 mm. longo et 3 mm. lato, basi obtuso, apice obscure uncinato, carina stigmatum obscura, pericarpio copiose glanduloso, seminibus plerumque 3 pendulis obovoideis nigris levibus nitidis, circiter 4 mm. longis et 1.5 mm. latis, apice rotundatis, basi angustatis, leviter angulatis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, alt. 1800 m., *Brass 12006* (TYPE), Jan. 1939 (much-branched shrub 1–2 m. high, very abundant as an epiphyte on high trees in mossy-forest; flowers white).

This species is suggestive only of *D. vaccinioides* Ridley, than which it has slightly larger leaves and flowers and more numerous petals (4–6 rather than 2) and stamens (14–18 rather than about 8). There are some discrepancies between the description of *D. vaccinioides* (in *Trans. Linn. Soc. II. Bot.* **9**: 13. 1916) and the illustration (l. c. *pl.* 1, *f.* 1–6). Thus, while the text describes the leaves as 5 mm. long and with 2 pairs of nerves, the plate shows them up to 7 mm. long and with about 4 pairs of nerves; the flowers are said to be 2 mm. broad, but the plate shows petals 3 mm. long. The stamens are apparently 1- or 2-seriate and the torus is more flattened than that of *D. microphylla*; *f.* 5 indicates that 2 carpels are sometimes present in the flowers of *D. vaccinioides*.

I have seen only staminate flowers of *D. microphylla*, although many were dissected; it is possible that pistillate flowers will prove to have fewer stamens. Most of Brass' specimens were taken from a staminate plant, but there are a few branchlets with fruits, apparently taken from a differ-

ent plant. The greatly reduced number of seeds, their strictly apical attachment, and their proportionately large size are noteworthy characters in *D. microphylla*; the fruits of *D. vaccinioides* have not yet been described.

Drimys buxifolia Ridley in Trans. Linn. Soc. II. Bot. 9: 13. 1916.

BRITISH NEW GUINEA: Central Division, southwestern slope of Mt. Albert Edward, alt. 3680 m., *Brass* 4239 (A, NY), 4322 (A, NY) (trees 2–5 m. high, very common in forests and often massed on fringes; branches erect and slender; branchlets reddish; leaves shining, aromatic; flowers white; fruit red); Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4602 (A, NY) (erect-branched pale-foliaged tree to 3 m. high, fairly common on forest-borders; flowers white).

In referring the specimens from the Central Division of British New Guinea to *D. buxifolia*, I am depending upon Ridley's original description: the type was collected by the Wollaston Expedition on the slopes of Mt. Carstensz in Netherlands New Guinea. This description delineates a plant essentially similar to those I have cited in vegetative and floral features (assuming that Ridley's "pedunculis 1 mm. longis" is a misprint for "1 cm."). While the original description mentions the petals as 4 and describes them as only 3 mm. long, our plants have the petals usually 2 (rarely 3 or 4 in no. 4602) and 4.5–8 mm. long. As expansion of the petals is rapid after the opening of the calyx, measurements of them, unless made at maturity, are not very dependable. As regards the stamens, Ridley describes them as 20; no. 4602 has them 18–27, and nos. 4239 and 4322 have them 13–18. The carpels are said by Ridley to be 3; no. 4602 has them 1, 2, or 3, and the other *Brass* specimens have them 3–7.

Variation in number of floral parts has been considered grounds for the erection of species in *Drimys*, but I believe such numbers to be constant only within rather broad limits. Examination of the carpels of *Brass* 4602 shows that, although they appear to be fully formed, they are quite sterile and devoid of ovules; the carpels of nos. 4239 and 4322 are apparently fertile and no. 4322 has mature fruits with about 9 seeds each. It thus appears that the species in this section of *Drimys* are polygamo-dioecious. The staminate flowers of *D. buxifolia* appear to have 18–27 stamens, 1–3 carpels, and 2–4 petals, while the hermaphrodite flowers have 13–18 stamens, 3–7 carpels, and uniformly 2 petals. The species is characterized by its compact habit, its small coriaceous oblanceolate or obovate leaf-blades (usually 12–18 mm. long and 5–12 mm. broad) with 3–5 pairs of obscure short lateral nerves, and its small solitary flowers. Thus *D. buxifolia* is somewhat intermediate between such diminutive species as *D. vaccinioides* and *D. microphylla* on the one hand and *D. pittosporoides* Diels and its several allies on the other.

Two other species from the interior of Netherlands New Guinea of this relationship are *D. Versteegii* Diels and *D. reducta* Diels, separated from *D. buxifolia* on slight foliage differences and variations in number of floral parts. In order to ascertain their true status, the types of these three species should be compared, together with more recently collected material.

Dr. C. T. White has found that *Brass* 4239 and 4322 precisely match the specimens from the Musgrave Range of British New Guinea which

F. v. Mueller (in Trans. Roy. Soc. Vict. 1(2):1. 1889) referred to *D. hatamensis* Becc. However, Beccari's species is not of this relationship, having very much larger leaves and pistillate flowers without stamens. *Drimys buxifolia*, if my determination is correct, will probably be found as a very common species at high elevations throughout the central portion of New Guinea.

***Drimys oligandra* sp. nov.**

Frutex dioicus (vel polygamo-dioicus?) parvus epiphyticus ubique glaber, ramulis gracilibus subteretibus juventute rubiginosis; foliis oppositis vel suboppositis interdum ternatim verticillatis, petiolis gracilibus leviter complanatis 1-2 mm. longis, laminis chartaceis obscure pellucido-punctatis lanceolato-oblongis, 2.5-5 cm. longis, 5-13 mm. latis, basi gradatim angustatis, apice obtuse acuminatis, costa utrinque leviter elevata, nervis lateralibus utrinsecus 3 vel 4 debilibus anastomosantibus utrinque paullo prominulis, rete venularum immerso; floribus ♂ solis visis in axillis foliorum 1-3 dispositis, pedicellis gracilibus sub anthesi 17-21 mm. longis; sepalis 2 membranaceis parce glandulosis suborbicularibus, 1.5-2 mm. longis et latis, apice obtusis; petalis plerumque nullis raro 1 (oblongo-obovato, circiter 2.5 mm. longo et 1 mm. lato, apice rotundato); toro parvo, staminibus 4-6 uniseriatis sub anthesi 1.5-2 mm. longis, filamentis carnosius leviter complanatis, loculis circiter 0.6 mm. longis oblique verticalibus; carpellis 1 vel 2 sterilibus obovoideis sub anthesi circiter 0.8 mm. longis, carina stigmatum subapicali.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1300 m., *Brass* 12975 (TYPE), Feb. 1939 (small shrub, epiphytic in high rain-forest; branchlets and petioles red; flowers white).

Drimys oligandra is a very distinct species, apparently without close relatives, characterized by its narrow subacuminate leaves which are sometimes opposite and sometimes subternate. Its staminate flowers are very small, with proportionately long pedicels; petals are usually entirely lacking (in several buds dissected), but in one flower a single petal was found. The stamens are very few for the genus; while such a small number as 4-6 may be expected in the hermaphrodite flowers of certain species, I know of no other case in which they are so few in staminate flowers.

***Drimys rubiginosa* sp. nov.**

Frutex dioicus 1-1.5 m. altus ubique glaber, ramulis gracilibus leviter angulatis juventute rubiginosis demum cinereis; petiolis rugulosis 4-6 mm. longis, laminis subcoriaceis oblongo-obovatis, (2-) 3-5.5 cm. longis, (1-) 1.5-2.5 cm. latis, basi angustatis, apice obtusis, margine anguste recurvatis, costa supra subplana subtus prominente, nervis lateralibus utrinsecus 4-6 anastomosantibus utrinque leviter elevatis et interdum supra insculptis, rete venularum supra immerso subtus prominulo; floribus ♀ solis visis, 2-4 in axillis foliorum aggregatis, pedicellis gracilibus subcarnosis 5-10 mm. longis; sepalis 2 submembranaceis orbiculari-ovatis, 2.5-3 mm. longis et latis, apice obtusis; petalis 2 submembranaceis obovato-oblongis, 4-4.5 mm. longis, 1.8-2 mm. latis, obscure trinerviis, apice rotundatis; toro parvo, staminibus nullis; carpellis 2-4 obovoideo-ellipsoideis sub anthesi circiter 2 mm. longis et 1.3 mm. latis, apice obtusis vel subacutis, carina stigmatum ventrali circiter 1.5 mm. longa, ovulis circiter 16 irregulariter biseriatis;

fructibus ad 4 mm. longis, seminibus subclavatis circiter 1 mm. longis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12629 (TYPE), Feb. 1939 (shrub 1–1.5 m. high, in mossy-forest, common on an exposed summit; branchlets, petioles, leaf-margins, and pedicels red).

Drimys rubiginosa is characterized by having its small pistillate flowers completely lacking stamens. In foliage it suggests *D. pittosporoides* Diels, differing in its thinner leaf-blades with more obvious venation. The flowers described for *D. pittosporoides* are presumably hermaphrodite; they have 20–25 stamens and 5 or 6 carpels.

It seems likely that the staminate plant of *D. rubiginosa* is represented by *Brass* 9104 (Netherlands New Guinea: Lake Habbema, alt. 3225 m.; prostrate and ascending shrub to 30 cm. high, in heavy ground moss of forest). The leaves of this specimen are essentially similar to those of the type in texture, shape, and size, but have the veinlet-reticulation slightly closer. The two petals are similar to those of the type, the stamens are 12–14, and the sterile carpels are 1 or 2. Without seeing more ample staminate and pistillate material from the two cited localities, I cannot feel certain that the two specimens are conspecific.

***Drimys Brassii* sp. nov.**

Frutex vel arbor ad 4 m. alta compacta polygamo-dioica ubique glabra, ramulis teretibus rugulosis nigrescentibus demum cinereis; foliis alternatis vel suboppositis apicem ramulorum versus congestis, petiolis rugulosis complanatis inconspicuis 0.5–4 mm. longis, laminis coriaceis elliptico- vel obovato-oblongis, (1.5–)2–3.5 cm. longis, (4–)6–13 mm. latis, basi obtusis vel attenuatis, apice obtusis vel rotundatis, margine anguste vel interdum valde recurvatis, costa supra subplana subtus leviter elevata, nervis laterilibus utrinsecus 4–6 brevibus adscendentibus inconspicue anastomosantibus saepe obscuris, supra planis vel leviter impressis, subtus paullo prominulis, rete venularum immerso; floribus ♂ apicem ramulorum versus axillaribus, pedicellis rectis sub anthesi 7–10 mm. longis; sepalis 2 submembranaceis suborbicularibus, 4–5 mm. longis et latis, apice obtusis; petalis 2 submembranaceis anguste obovato-oblongis, 5.5–7 mm. longis, circiter 2.5 mm. latis, apice rotundatis; toro convexo, staminibus 12–27 sub anthesi 1.3–3.5 mm. longis (exterioribus minimis) 2–4-seriatis, filamentis carnosis subteretibus, loculis 0.7–0.8 mm. longis oblique verticalibus; carpellis sterilibus 2 vel 3 (raro 1) obovoideis 1.5–2 mm. longis, apice uncinatis, carina stigmatum ventrali conspicua; floribus hermaphroditis non visis; pedicellis sub fructu crassis 6–15 mm. longis, carpellis 1–3 maturitate rugulosis ellipsoideis, 6–9 mm. longis, 4–5 mm. latis, basi et apice rotundatis, carina stigmatum fere ad basim elongata, pericarpio ut videtur carnosio, seminibus 15–24 nigrescentibus nitidis obovoideis vel semiobovoideis subfalcatis, 2–3 mm. longis, 1.3–2 mm. latis, basi angustatis, apice rotundatis.

NETHERLANDS NEW GUINEA: Lake Habbema, alt. 3225–3300 m., *Brass* 9068 (TYPE), Aug. 1938 (very abundant in shrubberies and thickets as a shrub or tree 0.5–3 m. high; foliage brown; fruit purple-black), *Brass* 9536 (common as a low shrub [15–20 cm.] on sterile limestone slopes); 6 km. northeast of Lake Habbema, alt. 3000 m., *Brass* 10671 (shrub 30–80 cm. high, plentiful in shrubberies of an open peaty area in forest); 2 km. east of Wilhelmina-top, alt. 3800 m., *Brass & Myer-Drees* 10126 (tree or shrub attaining 4 m., abundant in low forest clumps about timber-line), *Brass & Myer-Drees* 10303 (large shrub in subalpine forest; branchlets reddish; fruit black).

Drimys Brassii is characterized by its stiff compact polygamo-dioecious habit, its small coriaceous leaf-blades which are irregularly crowded toward apices of branchlets, its two narrowly obovate-oblong petals, its 2-4-seriate stamens (in staminate flowers) which are usually about 20 in number, and its 1-3 carpels (apparently in both staminate and hermaphrodite flowers, although the latter were not seen). The only described species to which it can be closely related are *D. Lamii* Diels and *D. pittosporoides* Diels. In foliage it seems closest to *D. Lamii*, but that species is described as having about 5 "tepala," presumably petals. While stability in the number of petals is not too dependable in *Drimys*, those species which commonly have 2 petals are more stable in this respect than the species with numerous petals. It is very doubtful that *D. Brassii*, in many flowers of which only 2 petals have been found, will prove ever to have 5 petals. The new species differs from *D. pittosporoides* in its smaller and proportionately narrower leaf-blades; that species is said to have 5 or 6 carpels, while the staminate flowers of our species have only 1-3 carpels and the hermaphrodite flowers (judging from the fruits) a similar number.

The species of this relationship are difficult to understand without access to the types and a larger series of specimens. The proposed new species is based primarily upon the three collections from the vicinity of Lake Habbema, which are quite identical in foliage. *Brass* 9068 and 9536 include both staminate and fruiting material, apparently gathered from different individuals, while no. 10671 is in fruit only. The two cited specimens from Mt. Wilhelmina almost certainly belong here. *Brass & Myer-Drees* 10126 was taken from a staminate plant, while no. 10303 is in fruit. Both staminate flowers and fruits are similar to those from Lake Habbema, but the plants have slightly larger leaves and more obvious lateral nerves. My description covers these two specimens.

Two other specimens from Mt. Wilhelmina which probably belong here are *Brass & Myer-Drees* 10111 and 10309; the former is said to represent one of the chief species at timber-line. They differ from the specimens above-described in minor details of foliage, and both are inclined to have larger (usually 1-carpellate) fruits with as many as 50 seeds per carpel.

***Drimys macrantha* sp. nov.**

Arbor erecta 2-3 m. alta dioica (vel polygamo-dioica?) ubique glabra, ramulis crassis nigrescentibus apicem versus 3-6 mm. diametro subteretibus rugulosis; foliis apicem ramulorum versus irregulariter dispositis, petiolis rugulosis supra leviter canaliculatis 3-7 mm. longis, laminis coriaceis obovatis, 5-9 cm. longis, 2-4 cm. latis, basi attenuatis et in petiolum decurrentibus, apice acutis vel breviter cuspidatis, margine anguste recurvatis, costa supra leviter subtus manifeste prominente, nervis lateralibus utrinsecus 9-12 cum aliis debilioribus interspersis erecto-patentibus supra prominulis etiam leviter insculptis subtus acute prominulis, rete venularum conspicuo copiose anastomosante utrinque valde prominulo; floribus ♂ apicem ramulorum versus in fasciculis laxis paucifloris dispositis, pedicellis sub anthesi 25-35 mm. longis saepe complanatis; sepalis 2 submembranaceis valde concavis suborbicularibus, 8-10 mm. longis et latis, apice rotundatis; petalis 5-7 inaequalibus submembranaceis obovatis, 10-14 mm.

longis, 4–6 mm. latis, basi conspicue angustatis, apice rotundatis, pinna-tinerviis; staminibus 55–65 toro conspicuo convexo 4- vel 5-seriatis, sub anthesi 2–4 mm. longis, filamentis carnosis subteretibus, loculis 0.8–1 mm. longis oblique subverticalibus; carpellis sterilibus plerumque 3 ellipsoideo-obovoideis circiter 2.5 mm. longis, carina stigmatum conspicua ventrali et apicali; floribus ♀ vel hermaphroditis non visis; pedicellis sub fructu crassis complanatis, carpellis 2 vel 3 rugosis obovoideo-ellipsoideis, 7–9 mm. longis, 4–5 mm. latis, basi breviter stipitatis, apice rotundatis, carina stigmatum ad basim ventrali, pericarpio carnosio, seminibus 15–20 castaneis nitidis falcato-ellipsoideis circiter 3 mm. longis et 2 mm. latis valde complanatis, basi subacutis, apice rotundatis.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4519 (A, TYPE, NY), July 16, 1933 (small stiff-branched tree 2–3 m. high, common on forest-borders; leaves stiff, with recurved apex and margins, glaucous when young; flowers white).

Drimys macrantha is closely related only to *D. grandiflora* Ridley, from which it differs in its petiolate leaves which, although paler beneath, are not “white,” its more numerous secondaries and more obvious veinlet-reticulation, its shorter pedicels, and its even larger flowers. It is also suggestive of *D. reticulata* Diels and *D. cyclopum* Diels, differing from both in its broader leaf-blades, much larger flowers, more numerous stamens, etc. The new species resembles *D. hatamensis* Becc. in foliage, but that species also has smaller flowers and 2 (sometimes 3 or 4) petals.

Drimys arfakensis Gibbs, Phyt. Fl. Arfak Mts. 135. 1917.

NETHERLANDS NEW GUINEA: Arfak Mts., in mossy-forest along the track to Angi from Momi, alt. 1800 m., *Kanehira & Hatusima* 13408 (shrub 1 m. high; flowers white).

The cited specimen shows some points of departure from the original description, but nevertheless it seems to represent a form of Gibbs' species; it bears staminate flowers, whereas the type has only pistillate. Our specimen differs from the type in having its leaf-blades smaller and with immersed veinlets and its petals 7–9 (rather than 12–14), shorter, and proportionately broader. The stamens are 19–22, the sterile carpels 4 or 5.

Drimys reticulata Diels in Bot. Jahrb. 54: 242. 1916.

NETHERLANDS NEW GUINEA: 15–18 km. southwest of Bernhard Camp, Idenburg River, alt. 1800–2150 m., *Brass* 11857 (very slender tree 3–4 m. high, a characteristic species of early second growths in mossy-forest), *Brass* 12149 (slender tree 3 m. high, plentiful in open places in mossy-forest; leaves glaucous beneath; flowers white), *Brass* 12494 (slender tree 2–4 m. high, one of the principal species in young seral growths in mossy-forest; leaves very glaucous beneath).

The cited specimens agree well with the description of *D. reticulata*, otherwise reported only from the type, collected in the adjacent Sepik region of Northeastern New Guinea. Although Brass' field notes indicate that the leaves are glaucous beneath when fresh, when dried they appear to be concolorous, as stated in Diels' description. The original specimen is in fruit, and therefore I add a description of the inflorescences based on the Brass collections. Of the cited numbers, 12494 is staminate, 12149 is pistillate, while the specimens of 11857, apparently taken from two trees, represent both sexes. If my identification is correct, the species is characterized by its strictly dioecious habit, small flowers, 4–6 petals, and re-

duced number of ovules. A comparison with the type is desirable before the following description can be definitely accepted as pertaining to *D. reticulata*.

Slender dioecious tree; flowers in small axillary fascicles of 2–4 (occasionally solitary) near ends of branchlets, the pedicels slender, 8–15 mm. long at anthesis; ♂ flowers: sepals 2, membranaceous, obscurely pellucid-glandular, broadly ovate, 2.5–3 mm. long and broad, subacute at apex; petals 4–6, submembranaceous, obscurely glandular, narrowly obovate-oblong, 4–5 mm. long, 1.5–1.8 mm. broad, obtuse at apex; torus small, the stamens 15–20, at anthesis 1–1.8 mm. long, 2- or 3-seriate, the filaments subterete, the locules about 0.4 mm. long, obliquely subvertical; carpels 2 or 3, sterile, ovoid-ellipsoid, about 1 mm. long, subacute at apex, the stigmatic ridge ventral, extending to base; ♀ flowers similar to the ♂ but without stamens, the carpels 3–6, ellipsoid, about 1.5 mm. long at anthesis, the stigmatic ridge ventral-apical, extending about halfway to base, the pericarp carnose, the ovules 2–4.

***Drimys obovata* sp. nov.**

Arbor gracilis 5–8 m. alta polygamo-dioica (vel dioica?) ubique glabra, ramulis subteretibus rugulosis apicem versus 2–4 mm. crassis brunneis vel cinereis; foliis apicem ramulorum versus irregulariter dispositis, petiolis rugulosis crassis 3–10 mm. longis, laminis coriaceis anguste obovatis, 8–17 cm. longis, 2–6 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice conspicue et plerumque acute cuspidatis vel breviter acuminatis, margine anguste sed valde recurvatis, costa valida supra elevata subtus prominente, nervis lateralibus utrinsecus 10–18 subrectis anastomosantibus utrinque valde prominulis, rete venularum utrinque leviter prominulo vel supra obsoleto; floribus ♂ ramulorum apice vel apicem versus congestis in fasciculis 6–12-floris dispositis, pedicellis gracilibus saepe complanatis sub anthesi 1–3.5 cm. longis; sepalis 2 submembranaceis late ovatis vel suborbicularibus, 5–6 mm. longis et latis, apice obtusis; petalis 2 submembranaceis anguste obovato-oblongis, 7–11 mm. longis, 1.5–2 mm. latis, apice obtusis; toro convexo, staminibus 35–55 circiter 4-seriatis sub anthesi 2–6 mm. longis (exterioribus minimis), filamentis carnosiss subteretibus, loculis subverticalibus 0.8–1.2 mm. longis basi leviter divergentibus; carpellis sterilibus 2–4 ellipsoideis 2–3.5 mm. longis, carina stigmatum ventrali longa; floribus hermaphroditis non visis; pedicellis sub fructu ad 3.5 cm. longis, carpellis 4–6 (vel abortu paucioribus) obovoideis, maturitate 5–7 mm. longis et 4–5 mm. latis, basi breviter stipitatis, apice rotundatis, pericarpio carnosissimo, stigmatibus elongatis, seminibus 10–16 nigrescentibus nitidis obovoideis complanatis, circiter 2.5 mm. longis et 1.5 mm. latis, basi angustatis, apice rotundatis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, alt. 2200–2350 m., *Brass* 11295 (TYPE), Nov. 1938 (undergrowth tree 5–8 m. high, common on ridges in fagaceous forest), *Brass* 11312 (slender tree 5–6 m. high, common on banks of forest streams); 9 km. northeast of Lake Habbema, alt. 2750–2800 m., *Brass* 10567 (slender tree 6 m. high, on open bank of a stream in mossy-forest; leaves concave; pedicels flat, red), *Brass* 10570 (tree 5 m. high, on open bank of a stream in forest; flowers white).

The cited specimens all bear staminate flowers except no. 11312, from which the fruits are described. *Drimys obovata* is characterized by its large

coriaceous narrowly obovate leaves with inconspicuous venation, its large flowers, and the large number of stamens in its staminate flowers. Its only close relatives seem to be *D. coriacea* Pulle and *D. dictyophlebia* Diels. From the first of these, the new species is distinguished by its more slender branchlets, proportionately narrower and more obviously pointed leaf-blades, often immersed and less obvious veinlets, and its 2 (rather than 3 or 4) petals. From *D. dictyophlebia*, *D. obovata* differs in having the costa of its leaf-blades raised rather than impressed above, its nerves less obvious on both surfaces, and its flowers larger and with more numerous stamens. From the description, I believe that *D. dictyophlebia* is represented in the present collection by the following fruiting specimen: Netherlands New Guinea: 4 km. southwest of Bernhard Camp, Idenburg River, alt. 900 m., *Brass* 13704 (tree 3–5 m. high, common in undergrowth of semi-open places in *Agathis* forest; leaves aromatic, subbullate; petioles red).

***Drimys hatamensis* Becc. Malesia 1: 185. 1877.**

NETHERLANDS NEW GUINEA: Arfak Mts., Angi, in forest by Iray, Lake Giji, alt. 1900 m., *Kanehira & Hatusima* 13785, 13935 (trees 2–3 m. high; petals white).

The cited specimens, which, like the type, come from the Arfak Mountains, agree with Beccari's description in all essential details and I have little hesitation in referring them to his species. Beccari described only the pistillate flowers, in which the petals are said to be two. *Kanehira & Hatusima* 13935 bears staminate flowers, in which the petals appear to be 2, 3, or 4 (in several buds examined). Both sepals and petals are conspicuously pellucid-glandular; the petals, which are readily caducous, are about 8 mm. long and 2.5 mm. broad at anthesis. The stamens are 28–32 and 2–4 mm. long; the carpels are sterile and 1 or 2 in number. Beccari states that the pistillate flowers have no stamens and 4 carpels. Number 13785, bearing immature fruits, has the carpels 2–5.

Diels (in Bot. Jahrb. 54: 242. 1916) referred three collections from the Sepik region of Northeastern New Guinea to *D. hatamensis*, and my present collections contain several specimens from British and Netherlands New Guinea which are very close to Beccari's species. These are the following:

NETHERLANDS NEW GUINEA: Lake Habbema, alt. 3225 m., *Brass* 9362, 9491 (trees to 3 m. high, frequent in forest undergrowth); 9 km. northeast of Lake Habbema, alt. 2800 m., *Brass* 10246 (tree 5 m. high). BRITISH NEW GUINEA: Central Division, Mt. Obree, alt. about 2400 m., *Lane-Poole* 347; Mt. Tafa, alt. 2300 m., *Brass* 4046 (A, NY), 4124 (A, NY) (common large shrubs in mossy-forest); Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4506 (A, NY) (spreading shrub in forest-borders; flowers white).

Of these specimens, only *Brass* 4506 and *Lane-Poole* 347 bear staminate flowers, the others being in fruit. The staminate flowers are essentially similar to those of the Kanehira and Hatusima collection, but the petals are slightly smaller and scarcely glandular, and the stamens are 24–30. Differences among the cited specimens in foliage are intangible, those from the Arfak Mountains having the veinlet-reticulation slightly less obvious. On the whole, I believe that Beccari's concept may well be taken to include the specimens from the central portion of New Guinea, but this conclusion

should be verified by future study. The species represented by the Brass and Lane-Poole specimens is apparently quite common in the Central Division. Lane-Poole (Rep. For. Res. Papua 86. 1925) referred his plant to *D. cyclopum* Diels, a species with leaf-blades proportionately much narrower. Dr. C. T. White states that the above-cited Brass specimens from the Central Division are similar to plants which F. v. Mueller (in Trans. Roy. Soc. Vict. 1(2): 1. 1889) determined as *D. piperita* Hook. f. *Drimys piperita* is a Bornean species with 8-10 petals, and its occurrence in New Guinea is questionable; Diels has not mentioned this species as occurring in New Guinea and none of my specimens suggest it.

BUBBIA v. Tiegh.

Originally proposed (in Jour. de Bot. 14: 293. 1900) for a group of seven species from Lord Howe Island and New Caledonia, *Bubbia* was first used for a New Guinean species by Dandy (in Jour. Bot. 72: 40. 1934). Burt (in Hook. Ic. Pl. 34: pl. 3315. 1936) noted that several of the New Guinean species referred to *Drimys* in reality belong in *Bubbia*; he indicated that *Bubbia* is a well-marked genus and made some of the required combinations. While I cannot accept Burt's reduction of *Belliolum* to *Bubbia*, the latter seems excellently separated from *Drimys*, and most workers in this group will not agree with Diel's recombination of the two genera (in Bot. Jahrb. 54: 240-245. 1916).

It is now obvious that *Bubbia* is highly developed in New Guinea. Diels (l. c.) recognized six species in this group (*Drimys*, *pro parte*), Ridley added one (*Drimys umbellata*), and on the basis of recently collected material I find it necessary to propose eleven more. I am inclined to question Burt's transfer of *Drimys parviflora* Ridley to *Bubbia*; from the description this appears to be a true *Drimys*. As now constituted, *Bubbia* contains 19 species from New Guinea, one from Queensland, two from Lord Howe Island, and eight from New Caledonia. A full appraisal of these species cannot be made with the material at hand, but from the descriptions most, if not all, appear to be well founded.

I am indebted to Prof. I. W. Bailey for calling to my attention Burt's discussion of the genus *Tetrathalamus* (in Kew Bull. 1938: 458-460. 1938). This genus may now be definitely reduced to *Bubbia*, as noted below under *B. montana*.

Bubbia bullata (Diels) comb. nov.

Drimys bullata Diels in Bot. Jahrb. 54: 243. 1916.

Although *Drimys bullata*, from Northeastern New Guinea, was described on the basis of a sterile specimen, there seems no reason to doubt its place in the genus *Bubbia*. Diels compares it with *Drimys Ledermannii* [*Bubbia Ledermannii* (Diels) Burt], from which it is said to differ in its bullate leaf-blades with the nerves impressed above and sharply prominent beneath.

Bubbia montana (Lauterb.) comb. nov.

Tetrathalamus montana Lauterb. in K. Schum & Lauterb. Fl. Deutsch. Schutzg. Südsee Nachtr. 319. 1905, in Bot. Jahrb. 58: 15. f. 4. 1922; Engl. in E. & P. Nat. Pfl. ed. 2. 21: 229. f. 100. 1925.

Tetrathalamus, originally described as a monotypic genus of Guttiferae

related to *Garcinia*, was discussed in a very informative paper by Burt (in Kew Bull. **1938**: 458–460. 1938), who placed it in the Winteraceae as a close relative of *Bubbia*. In all its morphological and anatomical details, *Tetralthalamus*, according to Burt, falls into the Winteraceae, and there can be no doubt that this is the correct position for the plant. The only point in which *Tetralthalamus* is at variance with *Bubbia* is in the coherence of its carpels, and one may doubt whether this is quite as complete as implied in figures *F* and *G* of Lauterbach's illustration, cited above. In figures *C* and *E* of this plate there is evidence that the coherence of the carpels is only superficial. In some other species of *Bubbia* (e. g. *B. pachyantha* A. C. Sm.) a coherence of the carpels in flower has been noted, and this in itself cannot be used as a character to separate *Tetralthalamus* from *Bubbia*. I have no hesitation in going a little farther than Burt and definitely reducing Lauterbach's genus to *Bubbia*. According to the original description and the illustration of *Tetralthalamus montanus*, the essential details of the species are as follows:

Petiole about 15 mm. long; leaf-blades elliptic-obovate, 15–18 cm. long, 4–6 cm. broad, obtusely cuspidate at apex, with about 11 pairs of primary lateral nerves ascending at an angle of about 50° and prominulous on both surfaces, the veinlets forming a reticulum; inflorescence terminal, apparently sessile and with about 3 primary rays, these twice-branched; pedicels 3–4 mm. long; calyx with 3 small lobes; petals 8, elliptic-oblong, the outer ones about 3.5 mm. long and 2 mm. broad, the inner ones smaller; stamens 12, about 1 mm. long and biseriate, with horizontal apical locules; carpels 4, adnate in flower, the stigmatic ridge short, strictly apical, the ovules 3, pendulous.

The species is thus far known only from *Schlechter 13984*, from the Bismarck Mountains of Northeastern New Guinea at an altitude of 1200 m. Its relationship is with *B. oligocarpa* (Schlecht.) Burt, than which it has smaller leaves and flowers, more numerous petals, fewer stamens with strictly horizontal (rather than oblique) anther-locules, and 4 adnate rather than 2 free carpels. A more distant relative of *B. montana* is *B. sylvestris* (described below).

Bubbia calothyrsa (Diels) comb. nov.

Drimys calothyrsa Diels in Bot. Jahrb. **54**: 244. 1916.

According to the original description, this species, thus far known only from the Sepik region of Northeastern New Guinea, is characterized by its large coriaceous leaf-blades with about 25 pairs of lateral nerves, these spreading at nearly right angles from the costa. The inflorescence is said to be ample and pedunculate, the petals up to 10 mm. long, the stamens 25–30, and the carpels 3–6.

Bubbia sororia (Diels) comb. nov.

Drimys sororia Diels in Bot. Jahrb. **54**: 245. 1916.

Like its close relative *B. calothyrsa*, *B. sororia* is known only from the Sepik region and has large leaf-blades with spreading nerves. It differs from its ally in being more slender throughout, with the leaf-blades more obviously nerved beneath, the petals smaller, and the stamens fewer.

***Bubbia pachyantha* sp. nov.**

Arbor pauciramosa ad 5 m. alta ubique glabra, ramulis crassis (apicem versus 3–7 mm. diametro) nigrescentibus rugosis subteretibus; petiolis crassis rugulosis 9–17 mm. longis anguste alatis; laminis crasse coriaceis oblongo-ellipticis, 6.5–10 cm. longis, 2.5–4 cm. latis, basi obtusis et in petiolum conspicue decurrentibus, apice obtusis et interdum inconspicue mucronulatis, margine valde revolutis, costa valida rugosa supra elevata subtus prominente, nervis lateralibus utrinsecus 15–20 inconspicuis valde patentibus utrinque prominulis et cum rete venularum anastomosantibus; inflorescentiis terminalibus vel apicem ramulorum versus axillaribus pauciramulosis paniculatis 3–6 cm. longis, pedunculis crassis rugulosis angulatis ad 3 cm. longis, ramulis paucis angulatis, pedicellis similibus ad 9 mm. longis (floribus interdum subsessilibus); calyce crasse coriaceo subrotato 6–8 mm. diametro, margine irregulariter 5–7-lobato, lobis ovato-deltoides circiter 1.5–2 mm. longis et 2–4 mm. latis, apice rotundatis vel obtusis, sinibus acutis; petalis 4 crasse coriaceis sub anthesi patentibus obovato-oblongis, 8–11 mm. longis, 6–7 mm. latis, basi obtusis, apice rotundatis; toro crasso columnari leviter quadrangulato circiter 2 mm. alto et 3 mm. diametro; staminibus plerumque 12 crasse coriaceis 2-seriatis obovoideis leviter complanatis, 2–2.5 mm. longis, filamentis apicem versus circiter 2 mm. latis basim versus contractis, loculis apicalibus vel subobliquis discretis circiter 1 mm. longis; carpellis 3 vel 4 sub anthesi adnatis obovoideis circiter 3 mm. longis angulatis, carina stigmatum ventrali et apicali, ovulis circiter 20 ut videtur 2-seriatis; calyce sub fructu persistente, carpellis maturis 3 vel 4 discretis et divergentibus, irregulariter obovoideo-subglobosis, 8–10 mm. diametro, carina stigmatum indistincta praeditis, pericarpio sublignoso; seminibus circiter 20 endocarpio spongioso irregulariter congestis nigris oblongo-ellipsoideis, circiter 3 mm. longis et 1.2 mm. latis, falcatis, basi et apice rotundatis.

BRITISH NEW GUINEA: Central Division, southwestern slope of Mt. Albert Edward, alt. 3550–3600 m., Brass 4371 (A, TYPE, NY), June 29, 1933 (sparsely branched tree about 5 m. high, fairly common in forests; leaf-blades very stiff, the margins much recurved toward base, the upper surface dark, dull green, the lower surface gray, the costa yellowish; petals cream-colored, at length red; seeds black).

This remarkably distinct species of *Bubbia* is characterized not only by its comparatively small coriaceous leaf-blades and winged petioles, but also by the leathery texture of all its floral parts and the fact that its 3 or 4 carpels are firmly adnate at anthesis along the ventral sutures; thus the gynaecium has the appearance of a compound ovary with a 3- or 4-parted stellate stigma. As the fruits develop, however, the carpels separate and mature in normal fashion for the genus. The seeds are unusually long and sharply curved. The stamens are usually quite regularly arranged, one being at the base of each petal and a superposed pair alternate with each pair of petals.

***Bubbia monocarpa* sp. nov.**

Arbor ad 2.5 m. alta glabra, ramulis rugulosis subteretibus apicem versus 4–6 mm. crassis; petiolis crassis semiteretibus 11–18 mm. longis; laminis chartaceis anguste elliptico-obovatis, 20–28 cm. longis, 7–9.5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice rotundatis vel obtusis, margine subplanis, subtus glaucis et ut videtur farinoso-ceriferis, costa supra leviter

impressa subtus prominente, nervis lateralibus primariis utrinsecus 15–17 anastomosantibus angulo $65-75^{\circ}$ a costa abeuntibus utrinque valde prominulis, secundariis debilioribus et rete venularum intricato utrinque leviter prominulis; inflorescentia terminali subsessili, radiis primariis circiter 4 adscendentibus gracilibus sub anthesi ad 8 cm. longis bis ramosis granulato-rugulosis; pedicellis gracilibus 3–5 mm. longis; calyce chartaceo rotato suborbiculari 3–3.5 mm. diametro vix lobato, margine subintegro; petalis 5 subcarnosis obovato-ellipticis, sub anthesi 3.5–5 mm. longis et 2–3 mm. latis, apice rotundatis; toro inconspicuo, staminibus circiter 17 carnosus obovoideis 2-seriatis 1.2–1.5 mm. longis, filamentis complanatis parce luteo-glandulosis apicem versus 0.6–1 mm. latis, loculis horizontalibus apicalibus 0.3–0.4 mm. longis; carpello unico obovoideo sub anthesi 1–1.5 mm. longo, apice rotundato et carina stigmatum elongata sub anthesi circiter 1.5 mm. longa coronato, loculo transverso, ovulis 30–40 pluriseriatis e placentis elongatis pendulis.

NETHERLANDS NEW GUINEA: Dalman, 45 km. inland from Nabire, alt. 400 m., *Kanehira & Hatusima* 12105 (TYPE), Mar. 1, 1940 (tree 2.5 m. high, in mossy-forest; flowers violet).

Bubbia monocarpa is related to *B. oligocarpa* (Schlecht.) Burt, from which it differs in its shorter and more slender inflorescence, its essentially circular and unlobed calyx, its 5 (rather than 6 or 7) petals, which are smaller, its essentially horizontal (rather than oblique) anther-locules, and its solitary carpel. From *B. longifolia* (described below), the new species differs in obvious foliage-characters, as well as in its calyx, smaller and fewer petals, and solitary carpel. The species of this alliance are characterized by their strictly apical stigmatic ridge and pendulous ovules.

***Bubbia longifolia* sp. nov.**

Arbor parva gracilis ad 1.5 m. alta glabra, ramulis teretibus granulato-rugulosis apicem versus circiter 6 mm. crassis; petiolis crassis angulatis vel anguste alatis 12–15 mm. longis; laminis chartaceis obovato-oblongatis, 35–40 cm. longis, 9–11 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice inconspicue cuspidatis vel subacutis, margine inconspicue recurvatis, supra in sicco fusco-olivaceis subtus glaucis et ut videtur farinoso-ceriferis, costa supra valde impressa subtus prominente, nervis lateralibus primariis utrinsecus 20–22 angulo $55-60^{\circ}$ a costa abeuntibus valde anastomosantibus utrinque acute elevatis, secundariis similibus sed debilioribus, rete venularum intricato utrinque prominulo vel subtus subimmerso; inflorescentia terminali vel subterminali subsessili, radiis primariis circiter 3 gracilibus sub anthesi ad 10 sub fructu ad 18 cm. longis 2- vel 3-plo ramosis leviter angulatis; pedicellis gracilibus sub anthesi 3–5 mm. longis demum longioribus; calyce parvo 3-lobato, lobis patentibus chartaceis deltoideo-ovatis, 1–1.5 mm. longis, 2–2.5 mm. latis, apice obtusis vel apiculatis; petalis tenuiter carnosus in alabastro agglutinatis ut videtur circiter 6 oblongo-obovatis, ad 7 mm. longis et 3.5 mm. latis, apice rotundatis; toro inconspicuo, staminibus 14–16 coriaceis plerumque 2-seriatis, circiter 2.5 mm. longis, filamentis complanato-obovoideis apicem versus 0.8–1.2 mm. latis, loculis apicalibus horizontalibus contiguis circiter 0.5 mm. longis; carpellis 3 obovoideis subcomplanatis, sub anthesi 2–3 mm. longis, basim versus angustatis, apice rotundatis et carina lineari cristiformi praeditis, loculo transverso, ovulis 24–32 irregulariter 2-seriatis pendulis; carpellis

maturitate ut videtur solitariis, fructu subgloboso ad 3 cm. diametro, carina stigmatum inconspicua, pericarpio crasse carnosio; seminibus numerosis turbinatis, 7–9 mm. longis, circiter 5 mm. latis, conspicue et irregulariter plicato-rugosis, basi abrupte contractis, apice rotundatis, in pulpa copiosa nidulantibus, testa tenui dura, endospermo oleaginoso-farinaceo.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, alt. 175 m., *Brass* 13868 (TYPE), Apr. 1939 (undergrowth tree 1.5 m. high, in rain-forest of lower mountain-slopes; flower-buds red; fruit pink).

Bubbia longifolia occurs at an unusually low altitude for the genus in New Guinea and has the longest leaves thus far known in *Bubbia*. The obovate-lanceolate leaf-blades, which are glaucous and apparently farinose-ceriferous beneath, amply characterize the species. Its closest relative appears to be *B. oligocarpa* (Schlecht.) Burt, from which it differs in its longer leaves, fewer stamens with strictly horizontal rather than obliquely apical-lateral anther-locules, and 3 rather than 2 carpels. The fruit of the new species is large for the genus and the seeds are noteworthy for their coarsely plicate-rugose surface. Another relative of *B. longifolia* may be *B. polyneura* (Diels) Burt, which, according to the description, has leaf-blades with about 40 pairs of lateral nerves and an inflorescence with comparatively numerous and strong rays.

***Bubbia sylvestris* sp. nov.**

Frutex vel arbor parva ubique glabra, ramulis subteretibus rugosis crassis (apicem versus 5–8 mm. diametro); petiolis rugulosis supra complanatis 1–2 cm. longis; laminis coriaceis obovato-ellipticis, 14–22 cm. longis, 5–7.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice rotundatis vel obtusis, supra fusco-olivaceis, subtus glaucis vel pallidioribus, margine saepe leviter recurvatis, costa valida supra subplana vel leviter elevata subtus prominente, nervis lateralibus primariis utrinsecus 14–20 cum secundariis angulo 65–75° a costa abeuntibus utrinque acute prominulis et cum rete venularum prominulo copiose anastomosantibus; inflorescentia terminali subsessili, radiis primariis ut videtur 6–8 ad 9 cm. longis 1- vel 2-plo ramosis gracilibus siccitate granulosis et striatis; bracteis bracteolisque minutis caducis, pedicellis ad 15 mm. longis plerumque brevioribus; calyce coriaceo 2- vel 3-lobato, lobis patentibus orbiculari- vel deltoideo-ovatis, 2–3 mm. longis, 3–5 mm. latis, apice rotundatis vel obtusis; petalis 8–10 chartaceis vel coriaceis elliptico- vel obovato-oblongis, leviter inaequalibus, exterioribus 8–10 mm. longis et circiter 6 mm. latis, apice rotundatis; toro columnari-pulvinato, 1–2 mm. alto, 2–2.5 mm. diametro; staminibus 22–35 crasse coriaceis 2- vel 3-seriatis clavato-obovoideis 1.5–2.5 mm. longis, filamentis leviter complanatis apicem versus 0.7–1.5 mm. latis basi contractis, loculis horizontalibus apicalibus 0.5–0.7 mm. longis; carpellis 3–5 coriaceis alabastro cohaerentibus mox liberis obovoideis, sub anthesi 2–3 mm. longis, basi contractis, apice rotundatis, carina stigmatum apicali ad 1.5 mm. longa, ovulis 25–40 pluriseriatis pendulis.

NORTHEASTERN NEW GUINEA: Morobe District, Ulap Trail, *Clemens* 41142 (TYPE), April 6, 1940 (shrub or small tree; flowers pale, greenish); Ogeramnang, alt. about 1800 m., *Clemens* 4463 (shrub 1 m. high, in forest; flowers green); Yunzaing, alt. about 1500 m., *Clemens* 4122 (tree or shrub about 3 m. high, in forest on mossy ridge; leaf-blades pale beneath; flower-buds green).

The three cited specimens are not precisely similar, the type having the

only fully developed inflorescence and having leaves which are conspicuously glaucous beneath. The other two specimens have more congested inflorescences and leaves which are apparently pale green beneath. In other respects the specimens are quite similar and I have little doubt that they represent the same species. A fourth plant which probably belongs here is *Clemens 5008*, also from the Morobe District (Ogeramnang, alt. about 1800 m.; small slender tree on forested hill; flowers green or purplish). This specimen, with leaves like those of the type, has very immature buds and apparently has the petals about 15 and the stamens about 40. Another collection which probably represents *B. sylvestris* is *Clemens 41800* (Boana, Morobe District, alt. 750–1350 m.), with leaf-blades up to 26 cm. long and 9.5 cm. broad, glaucous beneath. This specimen is in fruit and has the primary rays of the inflorescence reduced in number, probably through loss. The carpels are borne on conspicuous stipes 5–8 mm. long and are inequilaterally ellipsoid, up to 12 by 8 mm., with a subapical stigmatic ridge about 2 mm. long. The seeds are 15–20 in number, black, obovoid, about 4 by 3 mm.

Bubbia sylvestris appears to be closely related only to *B. oligocarpa* (Schlecht.) Burt, but that species has the leaf-blades larger and with more definitely ascending nerves, the rays of the inflorescence fewer, and the flowers smaller and with fewer parts (petals 6, stamens about 18, carpels 2). From *B. calothyrsa* (Diels) A. C. Sm. and *B. sororia* (Diels) A. C. Sm. the new species differs in its proportionately narrower leaf-blades with less widely spreading lateral nerves, sessile and less ample inflorescence, and floral details such as its broader petals, etc.

***Bubbia Clemensiae* sp. nov.**

Frutex vel arbor parva glabra, ramulis subteretibus rugosis crassis (apicem versus 4–7 mm. diametro); foliis alternatis, petiolis crassis rugulosis supra complanatis 1–1.5 cm. longis, laminis subcoriaceis supra nitidis ellipticis vel obovato-ellipticis, 17–24 cm. longis, 6–10 cm. latis, basi obtusis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine leviter recurvatis, costa valida supra leviter elevata vel complanata subtus prominente, nervis lateralibus primariis utrinsecus 12–20 cum secundariis brevioribus angulo 55–65° a costa abeuntibus utrinque acute elevatis marginem versus anastomosantibus, rete venularum supra leviter prominulo subtus inconspicuo vel subimmerso; inflorescentia terminali crassa pedunculata, pedunculo ad 7 cm. longo, radiis primariis ut videtur 3 vel 4 crassis ad 6 cm. longis nunc unifloris nunc apicem versus flora 2–4 gerentibus, pedicellis crassis 1–6 cm. longis ut pedunculo saepe valde complanatis; calyce coriaceo rotato 6–9 mm. diametro irregulariter 6–9-lobato, lobis brevibus 2–4 mm. latis, apice obtusis vel obscure apiculatis; petalis plerumque 6 crasse coriaceis, alabastro valde imbricatis, demum patentibus, inaequalibus, elliptico-oblongis, sub anthesi 11–17 mm. longis et 5–12 mm. latis, apice rotundatis; toro conspicuo subconico sub anthesi 3–4 mm. longo et circiter 2.5 mm. diametro; staminibus numerosis (100–125) confertis 5- vel 6-seriatis crasse coriaceis clavato-obovoideis, 2.5–3.5 mm. longis, filamentis leviter complanatis apicem versus 1.2–2 mm. latis inferne contractis, loculis horizontalibus apicalibus 0.6–1 mm. longis; carpellis 5–11 crasse coriaceis, alabastro

adpressis et subadnatis, mox liberis, obovoideis, sub anthesi circiter 3 mm. longis et diametro, angulatis, apice convexis, carina stigmatum conspicua apicali, ovulis circiter 15 anguste obovoideis pluriseriatis pendulis.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramnang, alt. 1750-1800 m., *Clemens 5157* (TYPE), Jan. 27, 1937 (small shrub or tree, less than 1 m. high, in hilly forest; petals dark maroon; anthers yellow; carpels green), *Clemens 4596* (same locality).

Bubbia Clemensiae is characterized by its large thick flowers with numerous stamens. Its closest relationship is probably with the preceding new species (*B. sylvestris*), from which it differs not only in its larger leaves and coarser inflorescence, but also in having its calyx irregularly 6-9-lobed (rather than regularly 2- or 3-parted), its petals fewer and larger, its stamens many more, and its carpels more numerous and with fewer ovules.

***Bubbia idenburgensis* sp. nov.**

Arbor ad 4 m. alta glabra, ramulis brunneis rugosis subteretibus apicem versus 4-7 mm. crassis; foliis apicem ramulorum versus irregulariter alternatim congestis, petiolis crassis rugulosis supra complanatis 1-2 cm. longis, laminis coriaceis anguste obovato-ellipticis, (8-)11-24 cm. longis, (3-)3.5-7 cm. latis, basi angustatis et in petiolum decurrentibus, apice obtusis vel obtuse cuspidatis, supra siccitate fusco-olivaceis, subtus glaucis, margine anguste recurvatis, costa supra impressa vel subplana subtus prominente, nervis lateralibus primariis utrinsecus 8-15 saepe inconspicuis angulo 55-65° a costa abeuntibus marginem versus anastomosantibus utrinque prominulis vel subplanis, rete venularum plerumque immerso interdum utrinque paullo prominulo; inflorescentia sub fructu terminali subsessili, radiis primariis 3-6 ad 11 cm. longis (centrali quam aliis longiore) 2(-)-plo ramosis rugulosis leviter angulatis, pedicellis gracilibus ad 1 cm. longis; calyce sub fructu subpersistente parvo irregulariter 2- vel 3-lobato, lobis tenuiter carnosus obscure glandulosus late reniformi-ovatis, 1-1.5 mm. longis, 2-3 mm. latis; toro convexo, staminum cicatricibus paucis ut videtur 2-seriatis; carpellis 4-6 vel interdum abortu paucioribus raro 1 obovoideo-turbinatis, ad 8 mm. diametro stipite basali conspicuo 0.5-1.5 mm. longo excluso, carina stigmatum inconspicua lineari 3-4 mm. longa apicali-ventrali praeditis, pericarpio crasso; seminibus 2-10 castaneis falcatis obovoideis, 3-4.5 mm. longis, 2-2.5 mm. latis, utrinque rotundatis, in pulpa spongiosa nidulantibus, testa dura.

NETHERLANDS NEW GUINEA: 4-6 km. southwest of Bernhard Camp, Idenburg River, alt. 900-1250 m., *Brass 13028* (TYPE), Mar. 1939 (tree 3 m. high, in rain-forest undergrowth; fruits red), *Brass 13313* (tree 2-4 m. high, common in mossy-forest undergrowth; leaves very glaucous beneath; fruit unripe).

Although the two cited specimens differ slightly in foliage, they are quite similar in fruiting inflorescences and are certainly conspecific. The leaf-blades of the type are slightly the larger and have the venation more obvious; the lateral veins of no. 13313 are essentially immersed and the costa is deeply impressed above.

Bubbia idenburgensis is characterized by its comparatively narrow coriaceous leaf-blades, its few and large seeds, and the position of its stigma on the upper part of the ventral edge of the carpel. Presumably the flowering carpel has the stigma partially ventral and partially apical. The new

species is perhaps most closely related to *B. umbellata* (Ridley) Dandy, but has the lateral nerves of the leaf-blade fewer, the petioles longer, and the inflorescence with fewer but longer rays. From *B. oligocarpa* (Schlecht.) Burt the new species differs in its proportionately narrower leaf-blades with fewer lateral nerves and less conspicuous venation, its more numerous carpels (probably 4–6 in flower), and its ventral-apical rather than strictly apical stigmatic ridge. The relationship of *B. idenburgensis* to *B. sylvestris* (above described) is less close.

***Bubbia glauca* sp. nov.**

Frutex vel arbor parva ad 2 m. alta glabra, ramulis subteretibus cinereis vel brunneis rugosis apicem versus 3–5 mm. crassis; foliis alternatis vel suboppositis, petiolis gracilibus rugulosis leviter canaliculatis 8–15 mm. longis, laminis chartaceis anguste obovatis, 12–19 cm. longis, (3.5–)4–6 cm. latis, basi gradatim attenuatis et in petiolum decurrentibus, apice subacutis vel breviter cuspidatis, supra fusco-olivaceis, subtus albido-glaucis, margine inconspicue recurvatis, costa supra leviter impressa subtus prominente, nervis lateralibus primariis utrinsecus 12–16 angulo 50–60° a costa abeuntibus marginem versus anastomosantibus utrinque valde prominulis, secundariis inconspicuis et rete venularum utrinque plerumque leviter prominulis; inflorescentia sub fructu terminali subsessili, radiis primariis 3–5 suberectis ad 8 cm. longis (longitudine variis) gracilibus granulato-rugulosis subsimplicibus vel semel ramosis, pedicellis 3–5 mm. longis; calyce sub fructu parvo subcoriaceo 3-lobato, lobis deltoideis circiter 1 mm. longis et 2 mm. latis subacutis; toro parvo, staminum cicatricibus paucis; carpellis (ut videtur sub anthesi 2) maturis solitariis vel binis, levibus vel leviter rugulosis, subglobosis, 10–12 mm. diametro, basi minute stipitatis, carina stigmatum inconspicua 3–5 mm. longa apicali-ventrali praeditis, pericarpio coriaceo circiter 2 mm. crasso; seminibus 8–11 in pulpa spongiosa nidulantibus, placenta incrassata apicali-ventrali gerentibus, castaneis levibus obovatoideis, circiter 4 mm. longis et 2.5 mm. latis, utrinque rotundatis.

BRITISH NEW GUINEA: Western Division, Palmer River, 2 miles below junction with Black River (upper Fly River region), alt. 100 m., *Brass* 7191 (TYPE), July, 1936 (shrub or small tree 2 m. high, uncommon in ridge-forest undergrowth; leaves aromatic, the blades gray beneath).

Bubbia glauca, which occurs at an unusually low elevation for the genus in New Guinea, is closely related only to *B. idenburgensis* (above described), with which it has in common an inconspicuous short apical-ventral stigmatic ridge on the fruit. The two species are also similar in leaf-shape, but *B. glauca* is more slender throughout and has the blades thinner in texture and with more obvious venation on both surfaces. The rays of the fruiting inflorescence of *B. glauca* are comparatively simple, each having very few fruits near its apex and being essentially unbranched; the rays of the inflorescence of *B. idenburgensis* are 2- or often 3-times branched and consequently the fruits are much more numerous. From the absence of additional scars on the fruiting torus of *B. glauca*, it seems likely that the flowers will prove to have only two carpels.

***Bubbia Archboldiana* sp. nov.**

Arbor ad 3 m. alta glabra, ramulis teretibus fuscis rugosis crassis (apicem

versus 5–8 mm. diametro); foliis irregulariter alternatis et apicem ramulorum versus congestis, petiolis crassis supra complanatis 4–9 mm. longis, laminis rigide patentibus coriaceis anguste elliptico-obovatis, (8–)12–18 cm. longis, 3–5.5 cm. latis, basi gradatim angustatis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine interdum inconspicue recurvatis, supra fuscis nitidis, subtus pallidioribus, costa lata supra leviter impressa subtus prominente, nervis lateralibus primariis utrinsecus 12–15 cum secundariis paullo debilioribus angulo 60–70° a costa abeuntibus supra valde prominulis subtus subplanis vel inconspicue prominulis, cum rete venularum supra manifesto subtus immerso copiose anastomosantibus; inflorescentia terminali subsessili vel pedunculo crasso ramulis simili ad 2 cm. longo praedita, radiis primariis 6–11 divaricatis 5–8 cm. longis (ramulis et floribus inclusis) 2- vel 3-plo ramosis crassis rugulosis, pedicellis rectis 3–7 mm. longis; calyce parvo irregulariter 2- vel 3-lobato, lobis patentibus obtusis deltoideo-ovatis, 1.2–1.5 mm. longis, 2–3 mm. latis; petalis 4 vel 5 carnosus alabastro imbricatis mox patentibus ellipticis vel obovato-ellipticis, 5–6 mm. longis, 3–4 mm. latis, apice rotundatis; toro convexo; staminibus circiter 17 plerumque 2-seriatis obovoideis 1.8–2 mm. longis, filamentis complanatis apicem versus circiter 1 mm. latis, loculis oblique horizontalibus apicalibus; carpellis 9 vel 10 congestis obovoideis, sub anthesi 2–2.5 mm. longis et 1.2–1.5 mm. latis, basi angustatis, apice subcomplanatis, carina stigmatum apicali et ventrali sed basim non attingente, ovulis 12–16 biseriatis ventralibus.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2100 m., *Brass* 12712 (TYPE), Feb. 1939 (tree 3 m. high, in an open situation in tall mossy forest; lower leaf surface glaucous; petals green, the entire inflorescence otherwise red).

Bubbia Archboldiana and the following new species (*B. megacarpa*) are remarkably similar in general appearance, but they are distinguished as later noted. Together they form a well-marked group, characterized by their elongate stigmas, which are extended along both the ventral edge and the apex of the carpel. *Bubbia Archboldiana* is perhaps most closely related, among described species, to *B. oligocarpa* (Schlecht.) Burt, differing in its short petioles, proportionately narrower leaf-blades, more copiously branched inflorescence, fewer petals, 9 or 10 (rather than 2) carpels, and the stigmatic character mentioned above. From *B. sylvestris* (above described) the new species differs in its fewer and much smaller petals, fewer stamens, more numerous carpels, and the obvious characters of stigmas and ovule-attachment. The new species may also be compared with *B. sororia* (Diels) A. C. Sm., a species with longer petioles, broader leaf-blades with more spreading lateral nerves, more ample inflorescence, more numerous and larger petals, fewer carpels, etc.

***Bubbia megacarpa* sp. nov.**

Arbor ad 3 m. alta glabra, ramulis pallide brunneis valde rugosis subteretibus apicem versus 4–7 mm. crassis; foliis alternatis, petiolis crassis rugosis supra complanatis vel subalatis 6–12 mm. longis, laminis coriaceis in sicco utrinque fuscis anguste elliptico-obovatis, 11–18 cm. longis, 3–5.5 cm. latis, basi angustatis et in petiolum decurrentibus, apice obtusis vel

rotundatis, margine saepe valde recurvatis, costa supra impressa subtus prominente et rugosa, nervis lateralibus primariis utrinsecus 10-14 cum secundariis debilioribus angulo $55-65^{\circ}$ a costa abeuntibus utrinque valde prominulis, cum rete venularum utrinque leviter prominulo copiose anastomosantibus; inflorescentia terminali pedunculo crasso brevi (ramulo defoliato simili) praedita, radiis primariis 3-5 divaricatis 5-7 cm. longis granulato-rugosis angulatis vel complanatis 1- vel 2-plo ramosis, pedicellis rigidis angulatis ad 10 mm. longis (floribus interdum subsessilibus); calyce parvo irregulariter 2- vel 3-lobato, lobis late ovatis, 1.5-2 mm. longis, 2.5-3.5 mm. latis, margine erosis; petalis 4 carnosis obovato-oblongis, 6-7 mm. longis, 4-5 mm. latis, apice rotundatis; toro breviter conico; staminibus 18-20 coriaceis 2- vel 3-seriatis obovoideis 1.5-2 mm. longis, filamentis apicem versus 1-1.3 mm. latis, loculis oblique apicalibus horizontalibus; carpello unico coriaceo inaequilaterali subobovoideo, sub anthesi circiter 2 mm. longo et 2.5 mm. lato et 1.5 mm. crasso, interdum marginis dorsalis apice leviter uncinato, margine apicali-ventrali rotundato, carina stigmatum elongata apicali et fere ad basim ventrali, loculo lineari valde curvato, ovulis circiter 50 vel ultra irregulariter pluriseriatis; pedicellis sub fructu crassis (2.5-4 mm. diametro) ad 15 mm. longis; fructu coriaceo transverse ellipsoideo, ad 4 cm. longo et crasso et 5 cm. lato, utrinque rotundato, basi complanato, apice curvato, carina stigmatum elongata conspicue ornato, pericarpio ruguloso, seminibus numerosis in pulpa copiosa ut videtur mucilaginosa irregulariter nidulantibus nigris obovoideis, circiter 5 mm. longis et 3 mm. latis, basi subacutis, apice rotundatis, testa tenui, endospermo oleaginoso-farinaceo.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, alt. 2800 m., *Brass* 10249 (TYPE), Oct. 1938 (tree about 3 m. high, common in forest undergrowth in wet bottoms; flowers white).

As previously mentioned, this species and the preceding (*B. Archboldiana*) closely resemble each other and are characterized by their elongate stigmas. In *B. megacarpa* the stigmatic ridge is much longer, extending along the entire apex of the carpel and along the ventral edge virtually to the base. In *B. Archboldiana* the stigmatic ridge extends over about two-thirds of the apex and a similar portion of the ventral edge. The ovulation of the two species is quite different, the locule of *B. megacarpa* being sharply curved to parallel the stigmatic ridge and extending from the base to near the dorsal apex, while the ovules are numerous and arranged in several irregular series. In *B. Archboldiana*, on the other hand, the locule is quite straight and does not reach the base, while the ovules are not more than 16, being arranged in two rows. A further difference, of course, pertains to the solitary carpel of *B. megacarpa* as contrasted with the 9 or 10 carpels of *B. Archboldiana*. In other floral details the two plants are quite similar, but the carpellary differences are striking and apparently constant.

Among less obvious differences, *B. megacarpa* has the leaf-blades only inconspicuously paler beneath rather than glaucous, and the veinlets more obvious beneath. *Bubbia megacarpa* has the rays of the inflorescence fewer, more obviously angled, and less copiously branched. The fruit of

B. megacarpa is quite unique among those thus far known in *Bubbia*, for its size, shape, and number of seeds.

***Bubbia argentea* sp. nov.**

Arbor parva, ramis crassis erectis, ramulis rugosis subteretibus apicem versus 5–8 mm. crassis; foliis irregulariter alternatis et apicem ramulorum versus saepe mox delapsis, petiolis validis rugulosis supra complanatis 10–18 mm. longis, laminis coriaceis anguste ellipticis, 12–17 cm. longis, 4–6.5 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis, margine inconspicue recurvatis, supra fusco-olivaceis, subtus argenteo-glaucis, costa valida granulato-rugulosa supra subplana subtus prominente, nervis lateralibus primariis utrinsecus 15–20 angulo 70–80° a costa abeuntibus conspicue anastomosantibus utrinque valde elevatis, nervis secundariis similibus sed brevioribus et cum rete venularum intricato utrinque prominulo copiose anastomosantibus; inflorescentia sub fructu juvenili terminali subsessili, radiis primariis 10–13 divergentibus ad 9 cm. longis 2- vel 3-plo ramosis rugulosis angulatis vel complanatis, pedicellis gracilibus 3–8 mm. longis; calyce coriaceo parvo 2- vel 3-lobato, lobis patentibus reniformi-ovatis, circiter 1.5 mm. longis, 2–2.5 mm. latis, apice obtusis; toro semigloboso-convexo, staminum cicatricibus circiter 20 ut videtur 2-seriatis; carpellis ut videtur 4–6 (demum interdum abortu paucioribus) post anthesin obovoideis, basi angustatis, apice rotundatis et carina stigmatum conspicua cristiformi apicali 0.6–1 mm. longa coronatis, ovulis circiter 12 pendulis; carpellis submaturis obovoideo-subglobosis ad 6 mm. diametro stipite basali valido 1–1.5 mm. longo excluso, carina stigmatum brevi inconspicua apicali, pericarpio crasso ruguloso; seminibus plerumque 4–6 nigris falcatis oblongis, circiter 2.5 mm. longis, 1–1.5 mm. latis, utrinque rotundatis, in pulpa spongiosa nidulantibus, pericarpio duro.

BRITISH NEW GUINEA: Central Division, Murray Pass, Wharton Range, alt. 2840 m., *Brass* 4740 (A, NY, TYPE), Aug. 7, 1933 (small tree with thick erect branches, rare in forests; leaves silver-gray beneath; immature fruit resinous; seeds black).

Although the cited collection lacks flowers and bears only immature fruits, it is obviously an undescribed species of the relationship of *B. calothyrsa* (Diels) A. C. Sm. and *B. sororia* (Diels) A. C. Sm., differing from both in its shorter petioles, smaller leaf-blades which are narrowly elliptic rather than oblanceolate, and more numerous and more spreading primary inflorescence-rays.

***Bubbia calophylla* sp. nov.**

Arbor parva (?) glabra, ramulis subteretibus crassis (apicem versus 7–10 mm. diametro); foliis alternatis, petiolis rugulosis 4–5 mm. diametro supra complanatis circiter 3 cm. longis, laminis subcoriaceis late oblongo-ellipticis, 25–30 cm. longis, 10–14 cm. latis, basi obtusis vel gradatim angustatis et in petiolum decurrentibus, apice ut videtur subrotundatis, margine leviter recurvatis, supra nitidis, subtus subglaucis, costa valida rugulosa supra leviter elevata subtus prominente, nervis lateralibus primariis utrinsecus 25–35 cum secundariis subsimilibus et paullo debilioribus angulo 70–85° a costa abeuntibus utrinque acute elevatis et conspicue anastomosantibus, rete venularum intricato utrinque conspicue prominulo; inflorescentia terminali multiflora, pedunculo ut ramulis crasso ad 7 cm. longo, radiis primariis

paucis ad 15 cm. longis 2- vel 3-plo ramosis, pedunculis secundariis crassis striatis complanatis 7-9 cm. longis, pedicellis sub fructu 3-10 mm. longis; calyce sub fructu persistente subcoriaceo 3-lobato, lobis patentibus deltoideo-ovatis, circiter 1.5 mm. longis et 2-3 mm. latis, apice obtusis vel subacutis; toro convexo coriaceo, staminum cicatricibus circiter 3-seriatis; carpellis 5-8 turbinatis parce luteo-glandulosis, basi conspicue stipitatis (stipite 2-3 mm. longo), apice rotundatis, in specimine nostro immaturis ad 6 mm. diametro, carina stigmatum inconspicua apicali brevi (0.6-1 mm. longa), pericarpio coriaceo; seminibus 8-15 castaneis obovoideis, 2-2.5 mm. longis, 1-1.5 mm. latis, valde falcatis, basi et apice rotundatis, in pulpa spongiosa irregulariter nidulantibus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramnang, alt. about 1800 m., *Clemens* 5061 (TYPE), Jan. 19, 1937.

Although flowers of this plant have not been seen, the material is ample to demonstrate that the species is undescribed. *Bubbia calophylla* is doubtless of the relationship of *D. calothyrsa* (Diels) A. C. Sm., with which it has in common large leaf-blades with broadly spreading lateral nerves. However, *B. calophylla* has longer petioles, leaf-blades broader in proportion and essentially elliptic rather than oblanceolate, with more numerous lateral nerves and in general more conspicuous reticulate venation, longer primary inflorescence-rays and on the whole a more ample inflorescence, and a short, nearly punctiform, apical stigma rather than an elongate stigmatic crest.

BELLIOLUM v. Tiegh.

In proposing the genus *Belliolum*, van Tieghem (in Jour. de Bot. 14: 330. 1900) included in it four New Caledonian species, of which only one (*B. Pancheri* (Baill.) v. Tiegh.) was known in flowering condition; this species may be considered the type of the genus. *Belliolum* is distinguished from *Bubbia* by having the anther-locules longitudinal and extrorse-lateral rather than horizontal and apical. In *B. Pancheri* the anther-locules are placed toward the base of the stamens.

Burt (in Hook. Ic. Pl. 34: pl. 3315. 1936), in connection with his new species *Bubbia haplopus* from the Solomons, expressed the opinion that *Belliolum* cannot be maintained as distinct from *Bubbia*, and consequently made several new combinations under the latter name. The basis for this opinion lies in the fact that certain specimens appeared to Burt to be intermediate, as regards the staminal characters, between *Belliolum* and *Bubbia*. He discussed at some length the New Caledonian collection of *Schlechter* 15348 (referable to *Belliolum crassifolium* (Baill.) v. Tiegh.), good flowering material of which is also available to me. The stamens of this species bear strictly vertical anther-locules, which are extrorse-lateral near the apex of the stamens. In fundamental details these stamens are similar to those of *Belliolum Pancheri*; the fact that the locules are borne near the apex rather than toward the base of the stamens does not necessarily weaken the generic character.

Another species discussed by Burt as intermediate between the two genera is *Bubbia amplexicaulis* (Vieill.) Dandy [*Bubbia auriculata* v.

Tiegh.],¹ in which "the anther-thecae are apical and almost touch at their tips, then they diverge downwards at an angle of 45° ; that is to say they are intermediate between transverse and longitudinal." In examining the numerous New Guinean species which are clearly referable to *Bubbia*, I have noted some in which the anther-locules are thus obliquely apical, although usually they are more horizontal than an angle of 45° would indicate. Stamens with this type of anther-locule are quite different from those of *Belliolum* proper, as represented by *B. Pancheri* and *B. crassifolium*. In the latter species the anther-locules, although subapical, are strictly longitudinal and are exceeded by a conspicuous continuation of the connective.

On the basis of material now available, therefore, it seems that *Belliolum* and *Bubbia* may be retained, the former having anther-locules which are always longitudinal and exceeded apically by the connective, while the latter has anther-locules which are horizontal (or subhorizontal), apical, contiguous, and not exceeded by the connective. This conclusion, of course, is provisional and must be tested with a larger series of specimens than is now available. For the time being it seems advisable to retain both genera as established by van Tieghem.

***Belliolum haplopus* (Burt) comb. nov.**

Bubbia haplopus Burt in Hook. Ic. Pl. **34**: pl. 3315. 1936.

SOLOMON ISLANDS: Bougainville: Okomo, Buin, alt. about 400 m., Waterhouse 90 (NY, type coll.); Koniguru, Buin, alt. 800 m., *Kajewski* 1994, 2007 (trees 10-15 m. high, common in rain-forest; leaf-blades silvery beneath; petals white; fruits pink when ripe, up to 16 mm. long and 14 mm. broad; native names: *oigu*, *ororoyu*); Kupei Gold Field, alt. 950 m., *Kajewski* 1658 (tree to 15 m. high, common in rain-forest, fruit pink, up to 25 mm. long and 16 mm. broad). Ulawa: *Brass* 2959 (tree 10 m. high, common in lowland rain forest; bark thin, gray; leaf-blades grayish beneath; flowers and fruits white).

The cited specimens agree well with a duplicate of the type and with Burt's excellent description and plate. With more abundant material, a slight expansion of the original characters should be noted, as follows: petioles up to 3 cm. long; leaf-blades up to 26 cm. long and 10 cm. broad, the primary lateral nerves 8-16 per side. The calyx is rotate and essentially entire at margin rather than bilobed; I have not found more than 10 petals (as noted by Burt) in my flowers, but these are sometimes up to 8 mm. long. There is considerable variation in the length of the pedicels (if the often 1-flowered peduncles are so interpreted); these range from about 1.5 cm. (*Brass* 2959) to 9 cm. (*Kajewski* 1658).

¹ *Bubbia amplexicaulis* is based upon *Drimys amplexicaulis* Vieill. ex Parment. in Bull. Sci. France & Belg. **27**: 308 pl. 10, f. 34. 1896. I cannot agree with Dandy (in Jour. Bot. **72**: 40. 1934) that Vieillard's name is adequately published by Parmentier. The description consists merely of the anatomical details of the leaf and stem, and the illustration shows a cross section of the petiole; no specimen is cited. It seems that the many new species proposed by Parmentier in his extensive work "Histoire des Magnoliacées" must be considered *nomina subnuda* and ignored from a nomenclatural point of view. Since no specimens are cited, the species cannot be recognized by subsequent workers unless they have access to Parmentier's specimens. For the species under discussion, therefore, I accept the name *Bubbia auriculata* v. Tiegh. (1900).

Belliolum Burttianum sp. nov.

Arbor ad 10 m. alta ubique glabra, ramulis subteretibus rugulosis apicem versus 3–5 mm. crassis; foliis apicem ramulorum versus subalternatis, petiolis gracilibus leviter canaliculatis 12–22 mm. longis, laminis chartaceis vel subcoriaceis in sicco fusco-olivaceis anguste obovato-ellipticis, 9–16 cm. longis, 4–6 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis, margine inconspicue recurvatis, subtus inconspicue ceriferis, costa supra impressa subtus prominente, nervis lateralibus primariis utrinsecus 9–11 sub angulo 65–75° a costa abeuntibus anastomosantibus utrinque valde prominulis, secundariis debilioribus et rete venularum intricato utrinque paullo prominulis; inflorescentia ramulis brevibus lateralibus terminali, radiis ut videtur 2–5 nunc unifloris nunc trifloris, pedicellis gracilibus leviter angulatis 2–6 cm. longis; calyce tenuiter coriaceo rotato circulari 4–5 mm. diametro, margine subintegro inconspicue bilobato; petalis circiter 25 subcarnosis 4–6-seriatis, exterioribus elliptico-oblongis ad 12 mm. longis et 7 mm. latis apice rotundatis, interioribus magnitudine gradatim reductis, intimis lanceolato-oblongis circiter 5 mm. longis et 1.5 mm. latis apice obtusis; staminibus circiter 3-seriatis 40–45 subcarnosis 2.5–3 mm. longis loculos verticales laterales 1–1.2 mm. longos paullo supra medium gerentibus, connectivo complanato obtuso 0.4–0.7 mm. ultra loculos producto; carpello unico obovoideo-turbinato sub anthesi circiter 3 mm. longo et 2.5 mm. lato, basi breviter stipitato, apice truncato et carina stigmatum nigra lineari circiter 2 mm. longa coronato, loculo obovoideo, ovulis circiter 35 placentis elongatis horizontalibus paullo supra loculi medium irregulariter dispositis.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, alt. 950 m., *Kajewski* 1680 (TYPE), Apr. 10, 1930 (tree to 10 m. high, common in rain-forest; petals white; carpel green).

Belliolum Burttianum is of the relationship of *B. haplopus* (Burt) A. C. Sm., from which it differs in its more numerous and larger petals, its stamens with the anther-locules nearer the apex and with the connective much less obviously produced, and its solitary carpel. The 3 or 4 carpels of *B. haplopus* are less regular in shape and have a stigmatic ridge only about 1 mm. long; the ovulation is essentially similar. In foliage the two species are close, but the leaves of *B. Burttianum* are substantially smaller and thinner on the average. *Kajewski's* description of the new species as "common" may not be reliable, as he obtained *B. haplopus* at the same locality and doubtless considered them the same.

It is a pleasure to name the new species for Mr. B. L. Burt, whose studies of this group of plants have greatly aided in clarifying their relationships.

Belliolum gracile sp. nov.

Arbor ad 5 m. alta glabra, ramulis subteretibus rugulosis apicem versus 2–3 mm. crassis; foliis subalternatis, petiolis gracilibus leviter canaliculatis 7–18 mm. longis, laminis chartaceis oblanceolatis, (6–)7–12 cm. longis, (2–)2.5–4.5 cm. latis, basi angustatis et in petiolum decurrentibus, apice rotundatis vel obtusis, margine planis vel inconspicue recurvatis, supra fusco-olivaceis, subtus albido-punctato-ceriferis, costa supra leviter impressa subtus valde elevata, nervis lateralibus primariis utrinsecus 7–10 sub angulo

55–65° a costa abeuntibus anastomosantibus et saepe curvatis utrinque prominulis, secundariis debilibus et rete venularum utrinque leviter prominulis; inflorescentia sub fructu terminali vel e ramulis brevibus lateralibus oriente subsimplici, floribus paucis ut videtur saepe solitariis, pedicellis gracilibus sub fructu ad 2.3 mm. longis; calyce sub fructu chartaceo rotato circulari ad 3 mm. diametro, margine integro, demum caduco; toro conspicuo semigloboso, cicatricibus staminum paucis; carpellis maturis solitariis vel binis coriaceis obovoideis, ad 18 mm. longis et 11 mm. latis, basi ad stipitem 1–2 mm. longum angustatis, apice rotundatis et carina stigmatum inconspicua 1–2 mm. longa coronatis, pericarpio extra ruguloso 1.5–3 mm. crasso; seminibus 10–20 (plerumque 3 vel 4 maturis, aliis abortivis) in pulpa spongiosa nidulantibus, obovoideis, 4–5 mm. longis, circiter 3 mm. latis, basi angustatis, apice rotundatis, placentis horizontalibus circa loculi medium dispositis.

SOLOMON ISLANDS: *G u a d a l c a n a l*: Tutuve Mt., alt. 1700 m., *Kajewski* 2630 (slender tree 4–5 m. high, common in poor rain-forest, the trunk to 7 cm. diam.; common name: *ses-a-veré*). *S a n C r i s t o v a l*: Hinuahaoro, alt. 900 m., *Brass* 2898 (TYPE), Sept. 22, 1932 (tree 4 m. high, in mountain-forest; leaf-blades gray beneath, the venation more obvious above; immature fruit smooth, green; all parts faintly aromatic), *Brass* 3063, 3063A (spreading shrub or small tree 1.5–3 m. high, in mountain-forest; leaf-blades gray-green beneath; fruit green, at length red, smooth, fleshy).

Although *B. gracile* is known only from fruiting specimens, I venture to describe it as new because of its vegetative differences from *B. haplopus* (Burt) A. C. Sm., doubtless its closest ally. In comparison with that species, *B. gracile* has the branchlets and petioles substantially more slender and the leaf-blades smaller and proportionately narrower, with fewer lateral nerves. From *B. Burtianum* (above described) the new species also differs in its more slender and small-leaved habit; it is expected that floral characters will provide additional distinctive points. Differences in fruit are also discernible between *B. gracile* and *B. haplopus*, the fruit of the latter tending to be subglobose rather than obovoid, with a longer stigmatic ridge (3–5 mm. long) and more numerous seeds (10–15 often maturing and an equal or greater number abortive).

***Belliolum Kajewskii* sp. nov.**

Arbor ad 8 m. alta glabra, ramulis subteretibus fuscis vel purpurascentibus apicem versus 3–5 mm. crassis; foliis alternatis confertis, petiolis gracilibus rugulosis leviter canaliculatis 1–2.5 cm. longis, laminis in sicco fuscis subcoriaceis oblanceolatis, (7–)10–17 cm. longis, 3–5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice obtusis vel paullo emarginatis, margine leviter recurvatis, subtus inconspicue punctato-ceriferis, costa supra impressa subtus prominente, nervis lateralibus primariis utrinsecus 13–17 sub angulo 65–75° patentibus brevibus anastomosantibus utrinque valde prominulis, secundariis numerosis et rete venularum intricato utrinque prominulis; inflorescentia sub fructu terminali vel e ramulis brevibus lateralibus oriente subsimplici, floribus interdum 2 vel 3 fasciculatis interdum apice radiorum paucis, pedicellis sub fructu 1.5–4 cm. longis; calyce sub fructu chartaceo rotato 4–5 mm. diametro, margine subintegro obscure 3-vel 4-lobato; toro semigloboso, cicatricibus staminum ut videtur 2-vel 3-seriatis; carpellis maturis solitariis vel binis oblongo-subglobosis, ad 16

mm. longis et 13 mm. latis, basi rotundatis et abrupte breviter stipitatis, apice truncatis et carina stigmatum lineari 5–6 mm. longa praeditis, pericarpio coriaceo extra ruguloso 2–3 mm. crasso; seminibus 20–40 obovoideis, 3–4 mm. longis, circiter 2 mm. latis, apice rotundatis, placentis horizontalibus paullo supra loculi medium irregulariter dispositis.

SOLOMON ISLANDS: *Bougainville*: Lake Luralu, Koniguru, Buin, alt. 1500 m., *Kajewski* 2099 (TYPE), Aug. 17, 1930 (small tree to 8 m. high, common in rain-forest; native name: *nomovour*). *Guadalcanal*: Uulolo, Tutuve Mt., alt. 1200 m., *Kajewski* 2574 (small tree 5–6 m. high, common in rain-forest; leaf-blades slightly silvery beneath; fruit red when ripe; native name: *ruvor*).

Belliolum Kajewskii is distinguished from the other Solomon Islands species of *Belliolum* discussed above by its narrow oblanceolate leaf-blades with more spreading lateral nerves. Its leaves are somewhat similar in shape to those of *B. gracile* (above described), but they are thicker and darker in color, and the two species are differentiated by obvious characters of the fruit; that of *B. Kajewskii* is proportionately broader, more flattened at apex, and with a longer stigmatic ridge and more numerous seeds. In foliage, the new species suggests certain New Caledonian species of *Belliolum*, such as *B. crassifolium* (Baill.) v. Tiegh., but all of those known to me have more complex inflorescences.

MAGNOLIACEAE

TALAUMA Juss.

Talauma oreadum Diels in Bot. Jahrb. **54**: 240. 1916.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1200 m., *Brass* 12976 (tree 5 m. high, in rain-forest underbrush, rare; flowers brownish white, fragrant; fruit red, 55 mm. long and 25 mm. in diameter); Arfak Mts., Angi, near Iray, Lake Giji, alt. 1900 m., *Kanehira & Hatusima* 13899 (tree 10 m. high, in forest; flowers white); Island of Japen, Seroei, alt. 250–370 m., *Neth. Ind. For. Serv.* 30413, 30619.

The cited specimens agree very well with the original description of *T. oreadum*, otherwise reported only from the Sepik region of Northeastern New Guinea. This is the only true *Talauma* thus far recorded from New Guinea, *T. papuana* Schlecht. having been referred to *Elmerrillia* by Dandy.

ELMERRILLIA Dandy

Elmerrillia papuana (Schlecht.) Dandy in Kew Bull. **1927**: 261. 1927.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, alt. 300 m., *Brass & Versteegh* 13594 (tree 23 m. high, occasional in primary rain-forest on the slope of a ridge; trunk 48 cm. diam.; crown not wide-spreading; bark 11 mm. thick, gray-brown, scaly; sap-wood yellow; heart-wood dark brown; flowers white); Island of Japen, Seroei, alt. 370 m., *Neth. Ind. For. Serv.* 30451.

The species has previously been reported from Northeastern and British New Guinea. I have not sufficient material to evaluate the two varieties proposed by Dandy, but his var. *glaberrima* (in Kew Bull. **1928**: 185. 1928) appears to be represented by *Brass & Versteegh* 13594. *Elmerrillia sericea* C. T. White (in Jour. Arnold Arb. **10**: 212. 1929) is doubtfully distinct from *E. papuana*.

MONIMIACEAE

TRIMENIA Seem.

Trimenia papuana Ridl. in Trans. Linn. Soc. II. Bot. **9**: 144. 1916.

NETHERLANDS NEW GUINEA: 9–20 km. northeast of Lake Habbema, alt. 2200–2700 m., *Brass* 10862 (tree 8 m. high, frequent in low substage of tall forest; flowers yellow), *Brass* 11292 (tree 3–6 m. high, common in open high undergrowth of ridge-crest forest; branches erect; young flowers white; fruit red), *Brass* 11601 (tree 8 m. high, in substage of midmountain forest, Bele River); Balim River, alt. 1600 m., *Brass* 11764 (erect shrub or small tree 2–3 m. high, plentiful in *Vaccinium* scrub on infertile sandy soil; fruit red); 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12628 (tree 2–3 m. high, in mossy-forest, common in low scrub on an exposed summit; branches upright; flowers white).

The cited specimens are apparently the first since the collection of the type, which was obtained in southern Netherlands New Guinea. Gilg and Schlechter (in Bot. Jahrb. **55**: 199. f. 1. 1918) referred several collections from Northeastern New Guinea to this species, but later (in Bot. Jahrb. **58**: 248. 1923) they correctly distinguished their material as a new species, *T. myricoides* Gilg & Schlecht. Several recent collections by Clemens in Northeastern New Guinea are also referable to *T. myricoides*.

DRYADODAPHNE S. Moore

Dryadodaphne S. Moore in Jour. Bot. **61**: 109. 1923; Kosterm. in Rec. Trav. Bot. Néerl. **34**: 605. 1937.

Isomerocarpa A. C. Sm. in Jour. Arnold Arb. **22**: 250. 1941.

During her work on the New Guinean species of Lauraceae, Dr. C. K. Allen called my attention to the fact that the genus *Dryadodaphne*, originally described as a member of the family, had been referred by Kostermans to the Monimiaceae. Kostermans believes that Moore's genus is identical with *Levieria* Becc. and that the species involved is possibly *L. montana* Becc. Although I have not seen the type of Moore's genus (*Forbes* 724 from British New Guinea), his description does not indicate that a species of *Levieria* was under consideration. *Levieria* has numerous stamens and lacks staminodes, and the anthers do not dehisce by valves. The presence of such valves, although not stated by Moore, is implied by his reference of the genus to the Lauraceae.

Among the few genera of Monimiaceae with anthers dehiscing by valves (subfamily Atherospermoideae), only the recently described *Isomerocarpa* agrees with *Dryadodaphne* in essential details. Moore states that the flowers of *Dryadodaphne* are unisexual, whereas the numerous flowers of *Isomerocarpa* which I have dissected are always hermaphrodite. According to Kostermans, the type specimen of *Dryadodaphne* "represents a male plant with flowers still in bud." In view of the immaturity of flowers, therefore, I consider it probable that Moore overlooked the juvenile carpels, which are deeply immersed in the urceolate receptacle and somewhat obscured by the numerous staminodes. In other respects, including dimensions of all parts of the plant, Moore's description of *Dryadodaphne celastroides* agrees with the specimens which I have referred to *Isomerocarpa novo-*

guineensis, and I have little hesitation in considering the plants conspecific.

While regretting the necessity of replacing the name *Isomerocarpa*, proposed only about a year ago, I nevertheless feel it advisable to accept the name *Dryadodaphne* for this interesting group in the Monimiaceae. A full description and a discussion of the place of the genus is to be found in my treatment of *Isomerocarpa*. The synonymy of the species follows:

Dryadodaphne novoguineensis (Perk.) comb. nov.

Daphnandra novoguineensis Perk. in Bot. Jahrb. **52**: 217. f. 5. 1915.

Dryadodaphne celastroides S. Moore in Jour. Bot. **61**: 109. 1923.

Isomerocarpa novoguineensis A. C. Sm. in Jour. Arnold Arb. **22**: 251. 1941.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

STUDIES IN THE LAURACEAE, V SOME EASTERN ASIATIC SPECIES OF BEILSCHMIEDIA AND RELATED GENERA.

CAROLINE K. ALLEN

A LARGE portion of the eastern Asiatic species of *Beilschmiedia* and *Cryptocarya* from the herbaria of the Arnold Arboretum, Gray, and New York Botanical Garden has been on loan to Dr. Kostermans for several years. As there is no immediate prospect of its return, it has seemed advisable to gather together such material as is available at present and to attempt to place the mass of Chinese specimens from recent collections. The intention of this paper, therefore, is not to present a complete study of the genera involved but rather to make usable what specimens we have. Originally *Beilschmiedia*, *Cryptocarya* and *Endiandra* only were to be considered, but on detailed study it proved desirable to propose a new combination in *Dehaasia* and a new genus, *Lauromerrillia*. *Cryptocarya* yielded a Chinese representative of the Indian genus *Syndiclis*. It goes without saying that in all probability some revision will be necessary when type material is available.

The following key will separate roughly the genera below. Unfortunately, it is almost always imperative that flowering specimens be at hand.

Flower parts in threes or multiple of threes

Fertile stamens 9

Leaves subverticillate in clusters at branchlet tips; branchlets conspicuously pale grey; flowers few with perianth lobes often unequal, borne on long slender pedicels; fruit subtended by expanded claviform pedicels.....*Dehaasia*.

Leaves not subverticillate; branchlets not conspicuously pale grey; flowers numerous with perianth lobes equal or subequal, borne on short pedicels; fruit subtended by pedicels symmetrically enlarged

Leaves usually conspicuously reticulate; flowers with perianth tubes absent or very shallow; fruit not costate.....*Beilschmiedia*.

Leaves usually not reticulate or very minutely so; flowers with perianth tube equalling the lobes in length; fruit conspicuously costate, at least in young stages*Cryptocarya*.

Fertile stamens 6; 6 glands alternate with perianth lobes.....*Lauromerrillia*.

Fertile stamens 3.....*Endiandra*.

Flower parts in twos or multiple of twos; fertile stamens 4.....*Syndiclis*.

The following letters are used to indicate the institutions in which the numbers cited are to be found: Arnold Arboretum (AA); Philippine Bureau of Science, Manila (M); New York Botanical Garden (NY); Jardin des Plantes, Paris (P); United States National Arboretum (Department of Agriculture) (USDA); United States National Herbarium (USNH); Vienna Botanical Garden (V).

Dehaasia Bl.**Dehaasia Cairocan** (Vidal), comb. nov.

Beilschmiedia Cairocan Vidal, Rev. Pl. Vasc. Filip. 223. 1886; Ceron, Cat. Pl. Herb. Manila 124, 1892; Merrill, Enum. Philip. Pl. 2: 198. 1923.

Haasia borneensis Meissn. in DC. Prodr. 15¹: 61. 1864.

Dehaasia borneensis F.-Vill., Nov. Append. 179. 1880. Non B. & H.

Beilschmiedia spec. Vidal, Sinops. 10, t. 78, F. 1883.

PHILIPPINE ISLANDS: *Ahern* 130 (USNH); *Barros* 17902 (USNH); *Belen* 23331 (AA, USNH); *Bernardo* 13113 (USNH); 15239 (AA); 17918 (USNH); *Curran* 10384, 10392 (USNH); *Franco* 21937 (USNH), 27791 (AA, USNH); *Klemme* 6643, 7125 (USNH); *Merrill* 2599 (USNH); *Paraiso* 19740 (USNH); *Ramos* 1075 (USNH); *Rosenbluth* 12807 (USNH); *Wenzel* 1238 (AA); *Whitford* 1683 (USNH).

HAINAN: *Lau* 538 (AA, NY, USDA, USNH, V), 1610 (AA, NY).

From the literature cited above one learns that both Meissner and Vidal had only fruiting material on which to base the species under discussion, and, if one may judge from Vidal's plate, that fruit was not fully mature. The fruit of the material cited from the Philippines appears typical of the genus *Dehaasia*. The long pedicel is inflated somewhat more at the apex than at its base and is usually as long as the fruit which it subtends. The flowering specimens show the typical slender panicles bearing flowers with unequal perianth lobes, the outer three being less than one half the length of the inner, and somewhat scale-like. All of the specimens resemble other members of the genus in their greyish twigs at once striate and roughened with leaf scars and the numerous oblanceolate or narrowly obovate long-petioled leaves borne in dense whorls at the tips of the branchlets. The Hainan numbers cited show precisely the same characteristics as those from the Philippines with the exception of the flowers which have perianth lobes of equal size.

A word should be added regarding the names *Haasia* and *Dehaasia*. *Dehaasia* was described by Blume in Rumphia, 1: 161. 1835, in honor of Dirk de Haas. Blume states clearly that in the Dutch language "de" and "van" are so closely connected with the family name that one can not take the liberty of separating them unless the resulting name should be discordant or too long and unwieldy. Nees (Syst. Laurin. 372. 1836) uses *Haasia*, giving in a foot note, presumably a quotation, Blume's statement concerning the origin of the generic name, but Nees misquotes and omits the reasons so clearly stated by Blume. There is no alternative but to accept Blume's earlier spelling of the name.

Beilschmiedia Nees

Beilschmiedia Fordii Dunn in Jour. Bot. 45: 404. 1907; Chun in Contr. Biol. Lab. Sci. Soc. China 15: 9. 1925; Liou, Laurac. Chine Indoch. 105. 1932.

HONGKONG: *Ford* (fragm. type, AA); *W.J.T.* (*Hongkong Herb. No. 9051?*) (AA); *W.J.T.* (*Hongkong Herb. No. 5223*) (AA). KWANGTUNG: *Lau* 1980, 2524, 2798 (AA); *To, Tsang & Tsang* 620 (*CCC No. 12620*) (AA, USDA, USNH); *Tsang* 21128 (USDA), 21130 (AA, NY), 21268 (AA, NY, USDA).

This species is characterized by heavily coriaceous, oblong, shining leaves. I have seen no flowering specimens, but Dunn describes the flowers as occurring in axillary cymes 2-3 cm. long, with thick peduncles

1 cm. long. The smooth, bluish black, ellipsoid fruits, frequently covered with a frosty bloom, are borne on enlarged pedicels in short subterminal or axillary infructescences. *Number 5223* from Happy Valley, the type locality, shows leaves with the nervation obscure on the upper surface, except for the impressed costa, and less so on the lower surface with the costa very prominent.

***Beilschmiedia brevipaniculata*, spec. nov.**

Arbor 3–7 m. alta, ramulis glabris, novellis leviter papillois, teretibus leviter striatis plus minusve nitidis rubro-brunneis. Folia opposita vel subopposita, lanceolata, 4–8 cm. longa, 1–2.8 cm. lata, coriacea, obtuse subacuminata saepe falcata, basi cuneata, utrinque glabra supra interdum nitida, in sicco brunnescentia, subtus laxe prominenter reticulata, penninervia, nervis lateralibus 4–6 (?) obscuris supra haud conspicuis subtus leviter elevatis, petiolis sat robustis ad 1.5 cm. longis, glabris. Inflorescentia terminalia raro axillaris brevipaniculata plus minusve 1 cm. longa (post anthesin longiora?) glabra, pauciflora, pedunculis 2–3 mm. longis. Flores $\pm$ 1 mm. longi, pallide flavi (fide coll.), glabri, perianthii lobis ovatis $\pm$ 1.7 mm. longis dense glanduloso-punctatis, tubo 0.8 mm. longo, pedicellis 0.5 mm. longis. Fructus nigrescens (fide coll.), in sicco brunnescens, opacus, glaber, dense minute conspicueque tuberculatus, ellipsoideus, apiculatus, 1.7×1.1 cm., calyce plus minusve deciduo reliquo subtentus, pedicellis incrassatis ad 1 cm. longis et 2.5 mm. crassis glabris.

KWANGSI: Shap Man Taai Shan, near Lu Shan Village, southeast of Shang-sze, Kwangtung Border (Shang-sze District) *Tsang 22418* (TYPE fl., AA) fairly common in thicket on steep rocky slope, June 4, 1933 (tree 3 m., fl. pale yellow); *Tsang 24350* (fruit, AA), *22402* (AA). HAINAN: *Lau 27302, 27305, 28227* (AA).

This species is more nearly related to *B. Fordii* Dunn from Hongkong than any other. The upper surface of the leaves is frequently shining and of a thick waxy texture such as is found in *B. Fordii*. The lanceolate leaves of *B. brevipaniculata*, however, are much smaller, not more than 8 cm. in length, the panicle shorter and the fruit tuberculate instead of smooth. Tuberculate fruit is characteristic of *B. Tsangii*, but the more membranous leaves and the very prominently and closely reticulate upper leaf surface easily separate the latter. The new genus *Lauromerrillia*, described later in this paper, has fruit which is tuberculate, although less conspicuously so than that of *B. brevipaniculata*.

***Beilschmiedia laevis*, spec. nov.**

Arbor (7–)10(–15) m. alta, ramulis glabris teretibus striatis, novellis saepe sulcatis, olivaceis robustis. Folia opposita vel subopposita, elliptica vel oblonga, ad 10(–11) cm. longa, 4–6 cm. lata, percoriacea, breviter obtuse acuminata, basi acuta, sat undulata, utrinque glabra, supra nitida, in sicco castanea, supra laxe crasseque subtus graciliter reticulata, penninervia, nervis ad 6 utrinque leviter elevatis, costa supra impressa subtus elevata, petiolis ad 2 cm. longis glabris robustis. Inflorescentia ignota. Infructescencia subterminalis, brevis, glaber, ad 4 cm. longa. Fructus brunnescens, glaber, ellipsoideus, apiculatus, ad 1.7×1.2 cm. (2.5×2 cm.), pedicellis pedunculis confusis incrassatis, ad 2 cm. longis et 4 mm. crassis.

HAINAN: *Liang 64997* (TYPE fruit, AA; USNH) in shaded forest on mountain side,

Feb. 20, 1934 (tree 10 m. or more high; diam. $2/3$ m.), 62018 (AA, USNH), 62603 (AA), 63377 (AA); *Lau* 3839 (AA); *Wang* 33228 (AA).

This species has been referred to *B. assamica* Meissn. but differs in its proportionately wider, elliptic leaves with longer petioles and the elliptic, very smooth, reddish (in herbarium specimen) fruit. It would seem that a character as consistent as the castaneous color of the leaves on drying and their always undulate margin would have been noted by Meissner had it been apparent in *B. assamica*. With *B. laevis* we are getting on the fringe of the troublesome *B. erythrophloia* Hayata, although the two species could never be confused. Again, there is no flowering specimen available, but the outstanding leaf and fruit characters indicate a new species.

Beilschmiedia yunnanensis Hu in Bull. Fan. Mem. Inst. Biol. 5: 306. 1934.

YUNNAN: *Tsai* 51834 (ISOTYPE fl., AA), 51697, 55013 (AA). TONKIN: *Fenzl* 27 (V).

Beilschmiedia yunnanensis possesses a leaf character unusual for the genus. The leaf surface is alveolate, a much finer condition than is habitually found. The flowers are typical of the genus. As yet, no fruiting material has been noted.

Beilschmiedia robusta, spec. nov.

Arbor 10–15 m. alta, ramulis glabris teretibus striatis griseis, novellis breviter sulcatis rubro-brunnescentibus. Folia opposita vel subopposita, lanceolata vel elliptica ad 10 cm. longa, $\pm$ 4 cm. lata, coriacea, obtusa vel acuta, basi cuneata, utrinque glabra, supra quam subtus sat nitidior, dense minuteque glanduloso-punctata, utrinque supra laxe subtus dense reticulata, penninervia, nervis lateralibus 9–12 supra obscuris subtus leviter conspicuis, petiolis ad 1.5 cm. longis leviter atratis. Inflorescentia axillaris et subterminalis, probabiliter paniculata, brevis, minusquam 2 cm. longa, glabra, pauciflora. Flores ad 3 mm. longi, sparse conspicueque glanduloso-punctati, virides (fide coll.), glabri, perianthii lobis ovatis 1.9 mm. longis. Fructus viridis (fide coll.), in sicco brunnescens et crasse rugosus, glaber, obovoideus vel subturbinatus, ad 3×2.5 cm., pedicellis ad 1 cm. longis 5 mm. crassis in sicco ferrugineis et aciculatis glabris.

YUNNAN: You-louh shan, Che-li, *Wang* 78157 (TYPE fl., AA) alt. 1415 m., thickets, Sept. 1936 (10 m. high, dbh. 0.6 m.; flower green), *Wang* 74395, 74491, 74759, 75303, 75363, 76785, 76805, 77074, 77384, 78238 (AA); *Yü* 16505 (fruit, AA), 18159 (AA); *Henry* 12777 (AA).

The specimens cited above have been determined as *B. erythrophloia* Hay. but are easily distinguished from the Formosan species by the more numerous veins, the coarser reticulation on the upper leaf surface, the larger, very fleshy obovoid or subturbinate fruit, and the broader less long-acuminate buds. As far as may be ascertained, *B. erythrophloia* Hay.¹ does not occur in China, although for years it has been credited to Yunnan and Hainan. *Beilschmiedia erythrophloia* has oblong, ovate-

¹ *Beilschmiedia erythrophloia* Hayata, Ic. Pl. Formos. 4: 20. 1914; Chun in Contr. Biol. Lab. Sci. Soc. China 15: 8. 1925; Hu, Wang & Hsia in Bull. Fan Mem. Inst. Bot. 8: 335. 1938.

oblong, ovate-lanceolate, or elliptic, long-petioled leaves up to 9×4.5 cm., according to the description, only slightly obtusely acuminate and prominently but closely reticulate. The fruit is obovoid, 2×1.2 cm., shining, rounded at the apex, obtuse at the base, with the pedicel scarcely enlarged. The specimens so labeled in the herbarium of the Arnold Arboretum differ from the description in having foliose branchlets bearing leaves not more than 6 cm. long, with only the suggestion of an obtuse acumen, a pedicel somewhat enlarged, and fruit rather pointed at the apex. This species has also been confused with *B. assamica* Meissn., from which it is easily separable by the smaller, lanceolate-elliptic leaves, not acuminate, with more obscure and more numerous, less arcuate lateral nerves and by the obovoid subturbinate fruit.

***Beilschmiedia intermedia*, spec. nov.**

Arbor ad 15 m. alta, ramulis glabris teretibus striatis, novellis leviter sulcatis, brunnescentibus saepe mox griseis. Folia opposita vel subopposita, elliptica 8.5 cm. longa, 4 cm. lata, coriacea, obtusa vel obtuse leviter subacuminata, basi cuneata, utrinque glabra, interdum in sicco pallide griseo-viridescens, subtus brunnescentia, utrinque laxe reticulata, penninervia, nervis ± 7 , leviter obscuris, petiolis ad 1.5 cm. longis brunnescentibus glabris. Inflorescentia axillaris, paniculata, brevis, ad 1.5 cm. longa, glabra, pauciflora. Flores ± 2 mm. longi, viridescenti-albi (fide coll.), glabri, perianthii lobis ellipticis 2 mm. longis dense conspicueque glanduloso-punctatis, marginibus scariosis, pedicellis ad 1.5 mm. longis glabris. Fructus in sicco brunnescens, glaber, minutissime tuberculatus, ellipsoideus, apiculatus, 3×1.5 cm., pedicellis incrassatis ad 1.5 cm. longis 4 mm. crassis, in sicco brunnescentibus aciculatis, glabris.

HAINAN: Yaichow, *Liang* 63217 (TYPE fl., AA) in dense shade in mixed woods, Oct. 14, 1933 (tree 12–15 m., diam. 1.5 m.; fl. green-white; fr. green), *Liang* 63324 (fruit, AA), 63409, 63429 (AA); *Lau* 5072 (AA); *McClure* (CCC No. 8158) (AA, USDA); *Wang* 34330 (AA).

Beilschmiedia intermedia is similar to *B. discolor*, but varies in fruit characters. It is possible that with more available material and closer attention to its collection in the field, this species may prove to be an intergrading form. The fruit is less pointed at the ends, more oblong than ellipsoid, and is borne on pedicels that are much more swollen.

***Beilschmiedia discolor*, spec. nov.**

Arbor (5–)9(–20) m. alta, ramulis glabris, novellis subglaucis teretibus sat striatis brunnescentibus mox griseis. Folia opposita vel subopposita, elliptica vel lanceolato-elliptica, ad 8.5 cm. longa, 3.5 cm. lata, coriacea, obtuse vel obtuse-acuminata, basi cuneata, utrinque glabra, supra lustro-viridis (fide coll.), in sicco plus minusve nitida, pallide griseo-viridescens, subtus brunnescentia, utrinque reticulata, penninervia, nervis lateralibus 6–8, petiolis 1(–1.5) cm. longis glabris brunnescentibus. Inflorescentia ignota. Infructescentia axillaris, paniculata, brevis ad 2 cm. longa, glabra, pauciflora, pedunculis ad 1 cm. longis. Fructus lustro-viridis (fide coll.), in sicco atro-rubescens, glaber, minutissime tuberculatus, anguste ellipsoideus, utrinque sat attenuatus, 1.8×0.8 cm., pedicellis leviter incrassatis ad 7 mm. longis et 2 mm. crassis brunnescentibus glabris.

HAINAN: Po-ting, *How* 73571 (TYPE fruit, AA), alt. 420 m., in forest, Aug. 31, 1935 (tree 9 m. high, bark brown; leaves lustrous green, coriaceous; fruit lustrous green); *How* 73719 (AA); *Lau* 406 (AA, USDA, USNH), 3806 (AA); *Liang* 64084 (AA), 64900, 65055 (AA, USNH), 65158 (AA); *Wang* 33551 (AA, USNH), 36846 (AA).

As mentioned before, the true *B. erythrophloia* Hay. apparently does not occur in China. The species nearest the latter is *B. discolor*, which differs in having pale leaves grey-green above and brownish below on drying. The branchlets are not as leafy as those of the sheets labeled *B. erythrophloia*. The fruit is more pointed at each end and the pedicels are distinctly more thickened than those of the latter.

***Beilschmiedia grandiosa*, spec. nov.**

Arbor ad 25 m. + alta, cortice purpureo-rubro (fide coll.), ramulis glabris teretibus striatis brunnescentibus mox griseis. Folia opposita vel subopposita, elliptica vel lanceolata, 6.5(–10) cm. longa, 2.5(–6) cm. lata, coriacea, obtusa vel obtuse acuminata, cuneata, utrinque glabra supra in sicco interdum nitida, pallide griseo-viridescens, subtus brunnescentia, utrinque reticulata, penninervia, nervis ± 7 , petiolis 1(–1.5) cm. longis glabris brunnescentibus. Inflorescentia ignota. Fructus nigrescens (fide coll.), in sicco brunnescens, glaber, minutissime tuberculatus, ellipsoideus, utrinque leviter attenuatus, apiculatus, 4 $\times$ 2 cm., pedicellis incrassatis ad ± 1 cm. longis et ± 4 mm. crassis brunnescentibus aciculatis glabris.

HAINAN: Yaichow, *Liang* 63142 (TYPE fruit, AA) shaded and mixed forests up mt., Sept. 26, 1933 (tall tree spreading 25 m. plus high, diam. 2–3 m.; bark purple-red; fr. black); *Liang* 63215 (AA, USNH); *How* 73139 (AA); *Lau* 25462 (AA).

The two sheets of *Liang* 63215 have fruit which looks rather abnormal, certainly less symmetrical than that of the type, and more attenuated at the ends. It may be another form of the same complex, or it may be an abnormality due to insect attack. *Beilschmiedia grandiosa* represents the largest fruited group of plants in what may be termed the *B. erythrophloia*-complex in China. The elliptic or lanceolate, coriaceous leaves are often up to 11 cm. in length. The minutely tuberculate fruits are ellipsoid, up to 4 $\times$ 2 cm., and are borne on enlarged pedicels up to 6 mm. in diameter.

These last three proposed species are difficult to separate from one another, all having similar characteristics generally and the same loose reticulation apparent on both surfaces of the leaves. The season of collection seemingly means little, for with the exception of *B. intermedia*, of which we have specimens only from October through December, fruit seems to have been collected in nearly every month of the year.

***Beilschmiedia pergamentacea*, spec. nov.**

Arbor 8–14 m. alta, ramulis glabris minute glandulosis teretibus striatis cicatricosis, sat atro-rubrescentibus. Folia opposita vel subopposita, lanceolata, (6–)11–15(–17) cm. longa, (1.5–)3(–4) cm. lata, pergamentacea, acuminata vel obtuse acuminata, basi attenuate cuneata, utrinque glabra, in sicco supra pallida, griseo-viridescens, subtus viridescens, clarior, minute denseque glanduloso-punctata, supra obscure subtus conspicuiore reticulata, penninervia, nervis 8–12, supra leviter elevatis sat obscuris subtus et costa elevatis rubrescentibus, petiolis ad 2 cm. longis glabris atro-rubrescentibus.

Inflorescentia ignota. Infructescentia axillaris, robusta, glabra, ad 10 cm. longa, fructu unico maturante. Fructus nigrescens, glaber, ellipsoideus, mucronulatus, ad 3.5×2.3 cm., pedicellis pedunculis confusis incrassatis clavatis striatis brunnescentibus ad 4 cm. longis et summis 6 mm. crassis.

HAINAN: Fan Yah, *Chun & Tso* 44247 (TYPE fruit, AA, USNH), alt. 1220 m., in forested ravine (tree 8 m., diam. 20 cm.); *Chun & Tso* 44015 (AA), 44122 (AA, USNH); *Lau* 26359 (AA); *Tang* 409 (AA).

The species with its lanceolate leaves, somewhat paler above and with venation prominent and reddish below, appears to be near *B. Poilanei* Liou from Indochina. The shorter inflorescence, with peduncle and pedicel merging into a robust clavate structure subtending the smooth ellipsoid fruit, separates it from the latter. These striking characters warrant description on fruiting specimens alone.

Beilschmiedia longepetiolata, spec. nov.

Arbor ad 20 m. alta, ramulis glabris teretibus striatis fulvo-brunnescentibus mox atratis vel griseis maculatis. Folia opposita vel alternata, lanceolata, elliptica vel oblanceolata, anguste obovata, (3–)6–12 cm. longa, (1.2–)3–4(–5) cm. lata, percoriacea, rotundata, saepe obtusa, basi attenuata cuneata, saepe undulata, utrinque glabra, supra nitida, subtus pallida, utrinque laxe, crasse prominenterque reticulata, penninervia, nervis lateralibus ± 6 utrinque elevatis, costa supra leviter subtus prominenter elevata, petiolis 1.5–2.5 cm. longis glabris supra planis. Inflorescentia subterminalis paniculata, ad 3 cm. longa, glabra, pauciflora, pedunculis ad 1.5 cm. longis nigrescentibus. Flores ± 3.5 mm. longi, albo-flavi (fide coll.), glabri, perianthii lobis ellipticis ± 2.5 mm. longis prominenter glanduloso-punctatis ciliolatis, pedicellis ad 5 mm. longis glabris. Fructus atro-virens (fide coll.), in sicco atratus, glaber, in sicco minute rugosus, ellipsoideus, 3×2 cm., pedicello incrassato ad 8 mm. longo, basi 4 apice 6 mm. crasso atrato glabro.

HAINAN: *Wang* 34640 (TYPE fl., AA) in mixed woods, Oct. 16, 1933 (tree 20 m. high; fl. white-yellow), *How* 71018 (fruit AA, USNH).

Wang 34640 at one time was pronounced to be a flowering specimen of *B. obovalifolia* Lct. from Indochina, but it differs from the description of that species in the following characters: the branchlets are pale reddish brown, later becoming greyish or darkened by reddish black blotches; the leaves are larger with nerves almost obscured by the very coarse, loose, prominent reticulation above and below; the petiole is not less than 1.5 cm. long and flat above. The fruit of *B. longepetiolata* is much larger, not obovoid as far as can be ascertained from the one crushed fruit on the specimen, and borne on a pedicel decidedly enlarged. There is no doubt, however, that the species is very close to *B. obovalifolia*. Another relative is *B. percoriacea* which differs in having reddish black young branchlets, larger leaves, shortly, obtusely acuminate, proportionately broader, more numerous, arcuate lateral nerves, blackish petioles, and ellipsoid fruit, 4.5×1.5 cm.

Beilschmiedia percoriacea, spec. nov.

Arbor, ramulis glabris teretibus ad nodos leviter complanatis striatis atro-rubrescentibus mox griseis. Folia opposita vel alternata, oblonga vel elliptica,

(9–)15 cm. longa, 4.5–6 cm. lata, percoriacea, breviter obtuse acuminata, basi cuneata, undulata, utrinque glabra, supra nitida, glanduloso-punctata, utrinque reticulata, penninervia, nervis 6–8 utrinque elevatis supra quam subtus conspicuioribus, costa supra leviter impressa subtus elevata, petiolis robustis ad 2 cm. longis sat canaliculatis glabris atratis. Inflorescentia ignota. Infructescentia axillaris, ad 4.5 cm. longa, glabra. Fructus lucido-viridis (fide coll.), in sicco nigrescens, laevis, ellipsoideus, saepe obliqua, ad 4.5×1.5 cm., pedicellis incrassatis ad 5 mm. longis et 4 mm. crassis glabris.

HAINAN: Po-ting, *How* 72964 (TYPE, young fruit, AA) alt. 840 m., in forest, June 21, 1935 (tree 7 m., bark brown; leaf deep green above, pale beneath, lustrous, coriaceous; fruit lustrous green); *How* 73523 (more mature fruit, AA); *Lau* 3612 (AA); *Liang* 63115 (AA). KWANGSI: *Ching* 8286 (V).

This species has the heavily coriaceous leaves of *B. longepetiolata* from Hainan but differs as has been noted under the latter. It is this leaf character which separates *B. percoriacea* from *B. Roxburghiana* Nees as well. Although no flowers are available, the leaf and fruit characters of the species seem to be sufficiently outstanding to warrant description. Possibly here belongs *Ford* 4 from Hongkong, Victoria Peak, 15 Aug. 1881, which has been referred to *B. jagifolia* Nees from Sylhet. Only a scanty leaf fragment is at hand, but it is probable that this is the proper identification. The species *B. jagifolia* has also been referred to *B. Roxburghiana* Nees. Liou separates *B. jagifolia* in his key on the smaller size of the leaf and the presence of a less stout petiole.

Beilschmiedia Roxburghiana Nees in Wallich, Pl. As. Rar. 2: 69. 1831; Chun in Contr. Biol. Lab. Sci. Soc. China 15: 8. 1925; Liou, Laurac. Chine Indoch. 110. 1932.

HAINAN: *Fung* 20123 (AA, USDA, USNH); *Lau* 3147, 27404 (AA).

These specimens agree fairly well with the description and photograph of the type but are all in fruit. I am inclined to think that a new species may be involved and that the above species does not occur in China. Until flowering specimens are collected, these numbers will be kept under *B. Roxburghiana*.

Beilschmiedia atrata, spec. nov.

Arbor ad 9 m. alta, ramulis glabris plus minusve teretibus striatis atro-rubrescentibus mox griseis. Folia opposita vel subopposita, elliptica, 8–13 cm. longa, 3–5.5 cm. lata, subcoriacea, obtuse acuminata, basi cuneata, margine undulata, utrinque glabra, supra nitida in sicco rubescenti-brunnea, minute glanduloso-punctata, utrinque obscure, laxe graciliterque reticulata, penninervia, nervis 9–11 costaque subtus elevatis, petiolis ad 1.5 cm. longis glabris. Inflorescentia axillaris, paniculata, brevis, ad 3 cm. longa, glabrescens, 5-flora, pedunculis ad 1 cm. longis. Flores 1.5 mm. longi, flavi (fide coll.), glabrescentes, perianthii lobis ± 2 mm. extus sparse intus dense canescenti-pubescentibus orbicularibus, pedicellis brevibus ad 5 mm. longis. Fructus viridescens (fide coll.), in sicco atro-rubescens, glaber, sat laevis, ellipsoideus, interdum apiculatis, 3×2 cm., pedicellis ad 1 cm. longis et 4–5 mm. crassis glabris.

HAINAN: Hung Mo Shan & vicinity, Lai (Loi) area, *Tsang & Fung* 693 (*L. U.* 18227) (TYPE fl. & fruit, AA; USNH, V), at top of mt. in forest, Aug. 12, 1929 (tree 9 m. high, diam. 12 cm.; fl. yellow; fr. green).

This seems at first to be very near *B. Roxburghiana*, but is separated by the smaller leaves with more obscure reticulation, the absence of a whitish tomentellous condition on the racemes and young branchlets, the elliptic (3×2 cm.) instead of oblong (4×1.5 cm.) fruit. The subcoriaceous leaves as well as the young branchlets of this species in the dried state are blackish red and the leaves are shining above.

***Beilschmiedia Wangii*, spec. nov.**

Arbor ad 7 m. alta, ramulis glabris summis glabrescentibus (probabiliter novellis pubescentibus) teretibus striatis rubro-brunnescentibus mox atro-rubrescentibus. Folia oblonga vel oblongo-elliptica, 9(–23) cm. longa, 3.5(–8) cm. lata, membranacea vel subcoriacea, obtuse subacuminata, basi acuta saepe obliqua, supra glabra, saepe nitida, supra nitida, subtus pubescentia, minute denseque glanduloso-punctata, plus minusve minute papillosa, supra leviter subtus conspicue reticulata, penninervia, nervis ad 9 supra leviter subtus conspicue elevatis, costa supra leviter impressa subtus conspicue elevata, petiolis ad 2.5 cm. longis glabris plus minusve minute papillosis. Inflorescentia axillaris et subterminalis paniculata, ad 6(–10) cm. longa, pubescens, ramulis bracteolis brevibus ± 2.5 mm. longis et ± 1 mm. latis dense ferrugineo-pubescentibus plus minusve obovatis vel lanceolatis subtentis, pedunculis ad 1.5 cm. longis. Flores 4–5 mm. longi, canescenti (fide coll.), pubescentes, perianthii lobis 3.3 mm. longis ellipticis glanduloso-punctatis, pedicellis gracilibus pubescentibus ad 1 cm. longis. Fructus atro-purpurascens (fide coll.), in sicco brunnescens, glaber, minutissime tuberculatus, oblongus, apiculatus, 5.5×2.2 cm., pedicellis sat clavatis incrassatis curvatis ad 2.5 cm. longis 5 mm. crassis, atro-rubrescentibus striatis glabris.

HAINAN: *Wang* 35745 (TYPE fl., AA), in mixed forest, Dec. 21, 1933 (tree 7 m., fl. white; fr. black); *Lau* 25637 (fruit, AA); 27396, 28280 (AA).

Beilschmiedia Wangii has oblong-elliptic, membranaceous or subcoriaceous, glandular-punctate leaves, minutely papillate on the lower surface and frequently oblique. The delicate reticulation is apparent on both surfaces but less so on the upper. The rather long-pedicelled, loose, large-flowered, axillary or subterminal inflorescences are outstanding because of the persistent somewhat ferrugineous pubescent bracts at the nodes. The flowers appear to be glandular-punctate in an unusual way, the glands appearing as black dots when the epidermis is torn. The slightly curved, almost club-shaped fruiting pedicels bear oblong (5.5×2.2 cm.) dark purple fruit. *Lau* 28280 has more elongate inflorescences, while the leaves of the fruiting specimen, *Lau* 27396, supposedly a shrub, are larger than those of the type and appear to be infected with fungal growth simulating pubescence. Even so, there can hardly be a doubt of their belonging to *B. Wangii*. The species probably belongs in the group with *B. Roxburghiana*, but is separated from it by the persistent floral bracts subtending the branchlets of the panicles.

***Beilschmiedia macropoda*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris teretibus striatis atro-rubrescentibus mox ferrugineo-maculosis. Folia opposita vel alternata, lanceolata vel oblonga (6.5–)9–12 cm. longa, (1.5–)2.5–4 cm. lata, subcoriacea, obtusa

vel obtuse subacuminata, basi cuneata, utrinque glabra, supra nitida, utrinque reticulata, penninervia, nervis ad 10 utrinque obscuris, petiolis sat gracilibus ad 2 cm. longis glabris. Inflorescentia ignota. Infructescentia axillaris, robusta, nunc ad 10 nunc ad 6 cm. longa, glabra, pedunculis robustis basi tumidis. Fructus viridis (fide coll.), in sicco pallide ferrugineus, glaber, sat lepidotus, ellipsoideus, apiculatus, 4.5×3 cm., pedicellis breviter tumidis utrinque 1 cm. pallide ferrugineis glabris, in sicco longitudinaliter rugosis.

HAINAN: *Wang* 34535 (TYPE fruit, AA; USNH), in mixed woods, Oct. 8, 1933 (tree 20 m. high; fr. green); *Wang* 35098 (AA); *Liang* 64329 (AA).

The above species is so striking in its fruiting characters that it is with no hesitation described as new. The large, ellipsoid fruit in dried state is rusty-brown, scaly and greatly wrinkled. The pedicel, which bears the same type of surface, is so swollen and enlarged as to appear to be a part of the fruit proper. The peduncles, whether long or short, are greatly enlarged at the base. From the description of the globular fruit by Liou (p. 106, Laurac. Chine Indoch.) the Indochinese species *B. Balansae* Lct. seems to have much the same type of surface, but no mention is made of the peculiar formation of the pedicels and peduncles. In any case, the leaves of the latter are elliptic or oval, shorter and broader accordingly and are only 5–6 nerved.

***Beilschmiedia obconica*, spec. nov.**

Arbor ad 25 m. alta, ramulis ferrugineo-tomentosis mox griseo-glabrescentibus teretibus striatis brunnescentibus. Folia opposita vel subopposita, elliptica vel oblongo-elliptica, saepe obliqua, (4–)6–9(–11) cm. longa, (2–)3.5–4(–6) cm. lata, pergamentacea, breviter obtuse acuminata, basi cuneata, subtus glabra, costa excepta, subtus pubescentia, minute glanduloso-punctata, graciliter reticulata, penninervia, nervis 7–11 supra leviter subtus conspicue elevatis arcuatis pallide rubescentibus, petiolis ad 2 cm. longis brunnescentibus. Inflorescentia ignota. Infructescentia brevis ad 4 cm. longa, breviter ferrugineo-pubescentis. Fructus nigrescens, maculosus, pallide brunnescentis, obconicus, minute apiculatus, 12×10 mm., pedicellis incrassatis leviter clavatis ad 8 mm. longis brunnescentibus ferrugineo-pubescentibus.

HAINAN: *Liang* 65199 (TYPE fruit, AA; NY, USNH), in shaded forest, along stream margin, Feb. 24, 1934 (tree 25 m. high or more, diam., $2\frac{1}{3}$ m.).

The only other species from eastern Asia with ferruginous pubescence is *B. ferruginea* Liou from Indochina, from which the above species is easily distinguished by the irregular reticulate venation, as opposed to the nearly parallel secondary venation of the latter. The obconical fruit is an unusual feature as well.

***Beilschmiedia Tsangii* Merr. in Lingnan Sci. Jour. 13: 27. 1934.**

KWANGTUNG: *Tsang* 20412 (PARATYPE AA; USDA, USNH), 20588 (ISOTYPE AA; USDA), 25201, 25282, 28827 (AA); *Lau* 2567 (AA); *Taam* 141, 214 (AA); *Tsang & Wong* 2490 (CCC 14351), 2642 (CCC 14503) (USDA); *To, Tsang & Tsang* 385 (CCC 12385) (USDA, USNH). HAINAN: *Liang* 62053, 62575 (AA, NY), 63278 (NY), 63362, 63411, 63417, 63428 (AA, NY). INDOCHINA: *Tsang* 27027, 29122, 29916 (AA).

The species, known only from Kwangtung and across the border in

Indochina, belongs in the group with *B. brevipaniculata*, from which it is easily distinguished by larger, less coriaceous, densely reticulate leaves, by longer inflorescences, and by larger fruit more minutely and less obviously tuberculate. Superficially, at least, it bears a resemblance to *Lauromcrrillia appendiculata*, the type of the new genus described below, but it is at once distinguished by the floral structure and by the very finely reticulated leaves, the reticulation obscuring the lateral venation on the upper surface. The Liang numbers are in fruit only and, although a Kwangtung-Hainan distribution is unusual, are nevertheless a good match for the species.

Cryptocarya R. Br.

The well known species of *Cryptocarya* from eastern Asia need no special treatment here. *Cryptocarya chinensis* Hemsl. and *C. densiflora* Blume, the only species of this region with trinerviate leaves, are easily distinguished from each other by size of leaves, inflorescence and fruit, which in the former is subglobose and in the latter globose-depressed. *Cryptocarya obtusifolia* Merr. stands out because of large heavily coriaceous, reddish tomentose leaves with numerous (9-11) veins, and long densely tomentose inflorescence. *Cryptocarya Maclurei* Merrill is noted for its dull greenish leaves, conspicuously glaucous below, and spherical fruit.

Cryptocarya hainanensis Merrill in Philip. Jour. Sci. **21**: 343. 1922; Chun in Contr. Biol. Lab. Sci. Soc. China **15**: 5. 1925; Liou, Laurac, Chine Indoch. 100. 1932.

Inflorescentia axillaris, stricte spiciformi-paniculata, ad 8 cm. longa, breviter fulvo-tomentella, pauciflora, pedicellis ad 2.5 cm. longis gracilibus, basi bracteis lanceo-linearibus pubescentibus subtentis. Flores ad 2.5 mm. longi, pubescentes, perianthii lobis extus intusque pubescentibus.

HAINAN: Bak Sa, *Lau* 26133 (fl., AA) in thickets, woods, April 8, 1936 (tree; leaf green above; flowers deep green); *Lau* 26392 (AA); *McClure* 2107 (CCC 8707) (TYPE, fruit, M; NY, USDA); *Tsang & Fung* 630 (*L. U.* 18164) (NY, USNH); *Wang* 34511 (NY, USNH), 34358, 36231 (NY).

Certainly *Lau* 26133 represents the flowers of *C. hainanensis* Merr. The tomentose spicate inflorescence is unusual for the genus but the flower structure is typical.

Cryptocarya concinna Hance in Jour. Bot. **20**: 79. 1882; Chun in Contr. Biol. Lab. Sci. Soc. **15**: 6. 1925; Liou, Laurac, Chine Indoch. 101. 1932.

KWANGTUNG: Buswell, *Levine & Tso* 6380 (M); *Levine* 150 (USDA, USNH), 3172 (USDA, USNH); *Tsang & Wong* 2173 (CCC 14574) (USDA), 2931 (CCC 14792) (USDA); *Liou* 836 (NY); *Ho* 60045 (NY); *Tsang* 25820 (AA). KWANGSI: *Liang* 70067 (AA).

This species has been for years a catch-all for specimens collected anywhere in southern China. Possibly the species is variable enough to include most of these, but many more numbers will have to be collected from intervening areas to make the fact known beyond doubt. At present we have available only the description and early Kwangtung numbers matched by Dr. F. P. Metcalf of Lingnan University with Hance's type, a flowering specimen collected by Ford in Happy Valley, Hongkong, and now in the British Museum. Since all Arnold Arboretum specimens of the genus have

been on loan since 1937, only specimens accessioned after that date are at hand for study.

Of the matching specimens cited above, nearly all have elliptic-oblong or oblong leaves, greyish green on drying, paler glaucous below with reticulation rather prominent, obtuse, subacute or rarely subacuminate, usually not more than 8 cm. long and 3 cm. broad. The fruit is black, oblong, 2×3 cm., smooth at maturity, slightly asymmetrical at base. *Ho 60045* has slightly larger, more symmetrical leaves with obtusely acuminate apices, but the fruits are a match for the others. Here might be mentioned a closely related number, *Fung 20428* from Hainan, in post anthesis stage, with very young fruit, the perianth lobes having fallen. The plant may possibly represent a new species, but it could not be described on such incomplete material, although the densely flowered terminal or subterminal subcorymbose inflorescence is distinct, as also are the elliptical obtuse or rarely subacute leaves $(3-6(-7) \times (2-3)$ cm.

Variation within the species in this complex occurs mostly in leaf form and size. Flowers are usually fairly constant, with little variation in structure. Fruit also is constant within the species. Hence, other characters being equal, a striking difference in fruit structure seems to indicate a good species. Going on this assumption, then, we have recognized as species *C. Chingii* (*C. Laui*) and *C. Metcalfiana* from Kwangtung, Kiangsi, Chekiang, Kwangsi and Hainan, with great vegetative variation but constant fruit and flower characters. We have also *Cryptocarya Tsangii*, *C. Leiana* and *C. Merrilliana* from Hainan, and *C. lenticellata* from Kwangtung, distinct from either of the first two mentioned species in leaf or flower or fruit, but not in all three characters.

Cryptocarya Chingii Cheng in P'ei, in Contr. Biol. Lab. Sci. Soc. **10**: 111, fig. 17. 1936.

Cryptocarya Laui Merr. & Metc. in Lingnan Sci. Jour. **16**: 83. fig. 3. 1937.

KWANGTUNG: *Lau 922* (fruit, NY); *To, Tsang & Tsang 12637 & 12793* (TYPES of *C. Laui*, fl., NY, USDA, USNH); *Taam 149, 166, 180, 302, 392, 397, 958* (AA); *Tso 20337, 21002, 21168* (NY); *Tsang 21292* (NY, USDA); *Wang 2886* (NY). KIANGSI: *Lau 4029, 4036* (AA, USNH). CHEKIANG: *Ching 2055* (ISOTYPE of *C. Chingii*, fl. & young fruit, USNH). KWANGSI: ?*Ching 7039* (NY); *Steward & Cheo 853, 1154* (NY); *Wang 40673* (AA). HAINAN: *Liang 62581, 63146* (NY), *63456* (NY, USNH); *How 70438* (NY); *Lau 26313* (AA); *Wang 34383* (NY).

Although the isotype of *Cryptocarya Chingii* is a poor specimen, it is evident that it can not be separated from the Kwangtung material described as *C. Laui* by Merrill and Metcalf. This species has been determined frequently as *C. concinna* Hance. The *To, Tsang & Tsang* numbers 12637, 12793, type material, present so great a range in leaf variation as to make them appear to be different species. However, a study of other specimens cited above shows a constancy of specific characters of flowers and fruit. The species is characterized by usually oblong (often elliptic on the same branch), obtusely acuminate, subcoriaceous leaves approximately three times as long as broad, slightly shining or dull above, paler below, bringing out the darker venation which is inconspicuous above. The young branchlets and very young leaves are covered with a fine silky pubescence

which disappears early for the most part. The axillary or subterminal, rather dense panicles, shorter than the leaves, are clothed with a close, greyish tan pubescence. Very young fruit is almost spherical but soon assumes the ellipsoid shape characteristic of the full-grown specimen. Immature fruit also has well defined longitudinal striations which disappear as it approaches maturity. Mature fruit is black, approximately $15-17 \times 10-12$ mm., borne on somewhat enlarged verrucose or rimose pedicels.

The Hainan numbers have been included only after careful consideration. Their leaves, on the whole, are more often elliptic than oblong and perhaps less acuminate, but there seem to be no other differences. The flowers are identical. *Lau 26313* and *How 70438* show immature fruits which differ in no way from the fruit from Kwangtung in the same stage of development.

***Cryptocarya Leiana*, spec. nov.**

Arbor ad 5 m. alta, ramulis gracilibus glabris, ultimis minute fulvo-pubescentibus, teretibus striatis olivaceo-brunnescentibus. Folia alternata, lanceolata vel lanceolato-elliptica, raro obovata, (4-)9-14 cm. longa, 1.5-4-5 cm. lata, subcoriacea, acuta, acuminata vel obtuse acuminata, raro retusa, basi cuneata, minute pubescens, mox glabrescens vel glabra, subtus glauca reticulataque, penninervia, nervis ± 5 supra obscuris, costa impressa, subtus elevatis, petiolis 5-10 mm. longis brunneis glabris glandulosis. Inflorescentia subterminalis vel axillaris, racemoso-paniculata, plerumque quam folia brevior, ad 6.5 cm. longa, ramulis gracilibus minute pubescentibus aliquid strictis. Flores ultimi plerumque 3 fulvo-pubescentes, 2-3 mm. longi, flavescentes, fragrant (fide coll.), sessiles vel brevi pedicellati, perianthii lobis ovatis ± 2 mm. longis intus paullo pubescentibus. Fructus in sicco glauco-purpureo-brunnescentis, glaber, ellipsoideus, apice basique leviter attenuatus, 12×7 mm., apice perianthii tubi reliquis coronatus pedicello leviter crasso situs.

HAINAN: Mei Maan and vicinity (Ching Mai District) Kai Lun Ko, *Lei 17* (TYPE, fl. & fruit, NY; USDA, USNH), rare in thickets on village commons on dry level land in sandy soil, Sept. 25, 1932 (woody, erect 5 m. high, 12 cm. diam.; fl. yellow, fragrant).

The species is distinctive because of the small ellipsoid fruit, never more than 12×8 mm., rough, minutely tuberculate and opaque on the surface with faint costa apparent. Seemingly these fruits are mature, although one should not overlook the possibility that they are not, in which case one might be forced to consider *C. Leiana* as an Hainan form of *C. Chingii*. The leaves are lanceolate-elliptic or oblong-elliptic, often slightly broader in the upper half, with the apex varying from rounded or retuse to obtusely acuminate, 6-13 cm. long, 3-5 cm. broad. The single branch of the type has subterminal or axillary racemose full-flowered panicles at its tip, and below, fruiting panicles bearing presumably mature fruits. The individual flower parts, stamens, etc., are on a larger scale than those of *C. Chingii*. The fruiting pedicels are only slightly swollen as opposed to much enlarged pedicels of *C. Chingii*.

***Cryptocarya Merrilliana*, spec. nov.**

Arbor (vel frutex ad 2 m.) ad 12 m. alta, ramulis ultimis sparse pubescentibus et lenticellatis saepe minute glandulosis rimosis brunnescentibus mox rubescentibus griseis maculosis. Folia alternata elliptica, raro oblongo-

elliptica, 5–12 cm. longa, 2–4 cm. lata, subcoriacea, obtuse subacuminata, basi cuneata, supra glabra, subtus pubescens, junioribus utrinque adpresse sericeo-pubescentibus, utrinque plus minusve obscure reticulata, penninervia, nervis 4–5 subtus quam supra elevatioribus, petiolis ad 1 cm. longis brunnescentibus pubescentibus mox glabris et atratis, plus minusve minute glandulosis. Inflorescentia subterminalis axillarisque, racemoso-paniculata, 3–5 cm. longa, quam foliis brevior, sericeo pallide brunneo-pubescens. Flores $\pm$ 3 mm. longi perianthii lobis ovatis 1.7 mm. longis intus leviter pubescentibus, pedicellis brevibus pubescentibus. Fructus in sicco olivaceus, glaber, costatus, minute tuberculatus, ellipsoideus, apice perianthii reliquis coronatus, ad 15×9 mm., pedicello crasso ad 2 mm. situs.

HAINAN: Kумын, *Lau* 27635 (TYPE fl., AA), in dense woods on slope, Aug. 7, 1936 (erect shrub 2 m., diam. 3 cm.; leaf green above; fruit green); *Lau* 26075 (AA); *Chun & Tso* 44398 (fruit, NY, USNH), 43887 (NY), 44043 (NY); *Wang* 33437 (NY, USNH), 35040 (NY).

This species also is well within the limits of the "concinna" complex, and approaches *C. Chingii* in general characters. It varies in its irregular leaves, usually elliptic and more coriaceous, and in twigs minutely glandular with their pubescence persisting longer. Again, it is possible that this may eventually tie in with a broader concept of the Hainan specimens of *C. Chingii*.

Cryptocarya lenticellata Lecomte in Not. Syst. **2**: 333. 1913; in Fl. Gén. Indoch. **5**: 145. 1914; Liou, Laurac. Chine Indoch. 99. 1932.

KWANGTUNG: *Lau* 20219 (AA, NY, USDA, USNH).

The above species has been reduced by Nakai (Jour. Jap. Bot. **16**: 122. 1940) to *C. Konishii* Hayata & Kawakami (List Pl. Formos. 95. 1910). The species seem close, but with only a description and no authentic material from Indochina for comparison I hesitate to accept the reduction, particularly in view of the discrepancy in range. The Lau specimen cited by Nakai is not from the Kwangtung-Tonkin border, but from near the monastery at Ting Woo Shan. For this reason the presence of an Indo-Chinese species is very probable. Although the Lau number cited is similar to the material of *C. Konishii* at hand from Formosa, at the same time it matches well the description of *C. lenticellata*. The fruit of *Lau* 20219, apparently immature, is larger than that of *C. Konishii*, and less broad at the base in proportion to its length. It seems to answer more nearly the description of the fruit of *C. lenticellata*. Certainly the fruits are no match for those seen on the Formosan material from New York or Washington. The pedicels are thickly swollen, which is not the case with those of the latter. Temporarily we will keep *C. lenticellata* a distinct species and consider *Lau* 20219 a Kwangtung representative.

Cryptocarya Metcalfiana, spec. nov.

Arbor ad 15 m. alta, ramulis ultimis glabris striatis sparse pubescentibus angulatis brunnescentibus. Folia alternata, lanceolata vel lanceolato-oblonga, (3–)7–8(–10) cm. longa, (1.2–)2.5(–4) cm. lata, coriacea, acuta, obtusa vel breviter obtuse acuminata, basi cuneata saepe obliqua, utrinque glabra, subtus leviter glauca, supra obscure subtus leviter reticulata, penninervia, nervis 5–7, subtus quam supra elevatioribus, petiolis 1–1.5

cm. longis brunnescentibus glabrescentibus. Inflorescentia subterminalis, racemoso-paniculata, densiflora, plerumque quam folia longior, ad 10 cm. longa, ramulis ultimis breviter pallide brunneo-pubescentibus. Flores ultimi 2–3, brunneo-pubescentes, 3 mm. longi, perianthii lobis viridescenti-flavescentibus (fide coll.), extus intusque pubescentibus, pedicellis pubescentibus $\pm$ 1 mm. longis tenuibus. Fructus in sicco olivaceus, immaturus viridis (fide coll.), glaber, obscure costatus, oblongus, apice perianthii reliquis coronatus, ad 17 mm. longus, 10–11 mm. latus, pedicello crasso 2–3 mm. longo situs.

HAINAN: Chim Shan Fan Maan, Ts'uen & vicinity, Ling Shui (Ling-tui) District, *Fung* 20087 (TYPE fl., NY; USDA, USNH), growing in forest and lower slope of the mt. (tree 15 m., diam. 24 cm., flower greenish yellow); *Lau* 1259, 1742 (NY), 5831 (AA), 27399 (AA); *Liang* 63261 (fruit, NY), 62347, 63302, 66049 (NY); *Wang* 33441 (NY).

This species is near *C. concinna*, but differs in having leaves that are on the whole larger and more coriaceous, and inflorescences more densely flowered and longer than the leaves. *Lau* 27399 and *Liang* 66049, in very young fruit, bear leaves more shining and generally longer than those of the type.

***Cryptocarya Howi*, spec. nov.**

Arbor ad 16 m. alta, ramulis teretibus glabris striatis plus minusve pallide viridescenti-brunnescentibus. Folia alternata irregulariter lanceolato-ovata vel ovata vel saepe oblonga, 5–9–12(–14) cm. longa (2–)3(–5.5) cm. lata, coriacea, attenuate, acute vel obtuse acuminata, saepe obliqua et falcata, basi rotundata vel cuneata, glabra subtus conspicue glauca, penninervia, nervis 3–5 supra leviter impressis subtus conspicue elevatis, petiolis ad 1.5 cm. longis crassis glabris brunnescentibus. Inflorescentia subterminalis racemo-paniculata, congestiflora, plerumque quam folia brevior, ad 7 cm. longa, ramulis brunnescentibus pubescentibus mox glabrescentibus. Flores ultimi 2–3, breviter griseo-pubescentes, 2–3.5 mm. longi, flavo-canescens (fide coll.), sessiles vel brevi-pedicellati, perianthii lobis ellipticis $\pm$ 2 mm. extus intusque pubescentibus. Fructus niger (fide coll.), in sicco olivaceo-brunnescens, obtuse 9-costatus, oblique oblongus, apice perianthii reliquis coronatus, ad 2.5 cm. longus, ad 1.2 cm. latus, crasso pedicello situs.

HAINAN: Woods, Yaichow, *How* 70499 (TYPE fl., NY; USNH), alt. 510 m., Mar.–July, 1933 (tree 9 m.; fl. yellowish white); *Wang* 36759 (fruit, NY), 33969 (NY); *How* 70839 (NY); *How & Chun* 70132 (NY, USNH), 63302 (NY).

Cryptocarya Howi is similar to *C. Metcalpiana*, but the leaves are, on the whole, larger and more irregularly lanceolate-ovate or ovate, usually more rounded at the base, and very glaucous beneath, making the darker veins stand out more clearly. The branchlets have a greenish brown tinge. In leaf shape this species resembles *C. Tsangii* as well. The blades are coriaceous, elliptic or usually slightly ovate-elliptic with obtusely subacuminate or obtusely acute apices and with bases rounded to abruptly cuneate. The lower surface is glaucous at first, later more or less concolorous. The midrib is slightly impressed above and strongly elevated below. The lateral veins, 4–5 pairs, spread upward, arching slightly toward the margin, and are inconspicuous on the upper and elevated on the lower surface. The reticulations are more apparent on the lower surface.

The petioles are 1.5 cm. long. The inflorescences are 5–10 cm. longer than the leaves. The mature fruits are long-ellipsoid, black and faintly striate, 2.5×1.2 cm. These specimens, heretofore placed under *C. concinna*, are a far cry from the original description of that species and from the presumably authentic specimens indicated by Metcalf as a match for the type at British Museum.

HAINAN: *Tang* 423 (AA); *Lau* 1456 (NY); *Liang* 64204 (NY).

The above numbers from Hainan can be separated from *C. Howi* only by their stouter, dark brown branchlets and larger, more coriaceous leaves (15×5.5 cm. with petioles up to 2 cm. long). The branchlets of the inflorescence also are stouter. Lau's field label for the flowering specimen says "rare," so perhaps we have another species. Nevertheless, the congested inflorescence, the long oblong fruit and the leaf shape present similar characters to those of the type.

***Cryptocarya Tsangii* Nakai, Jour. Jap. Bot. 16: 121. 1940.**

HAINAN: *Tsang & Fung* 688 (*L. U.* 18222) (ISOTYPE, NY, USNH).

No flowering material of this species is available. From the fruiting branchlets it is apparent that a separate entity is involved. The heavily coriaceous leaves are bright brown, very shining above, dull below with the venation elevated and more apparent, and are borne on rubescent petioles. The young twigs are more or less rubescent and frequently covered with paler lenticels. The black fruit is ellipsoid, often with a very slight tendency to be obovoid, longitudinally striate, minutely tuberculate. It is a question again if this may not represent a form of *C. Metcalfiana*. It is certainly very close.

***Cryptocarya annamensis*, spec. nov.**

Arbor 10(–20) m. alta, ramulis teretibus striatis nigro-rubrescentibus, ultimis ferrugineo-pubescentibus mox glabrescentibus, ad nodos complanatis. Folia alternata, oblonga vel elliptica, raro late elliptica, (6–)8–9 cm. longa, (2.5–)3(–4.5) cm. lata, coriacea, obtuse acuminata, vel obtuse acuta, basi rotundata vel obtusa, saepe obliqua, utrinque glabra, subtus glauca, supra leviter subtus conspicue reticulata, penninervia, nervis 4 supra plerumque obscuris subtus elevatis ferrugineo-pubescentibus mox glabris, petiolis 1–1.5 cm. longis probabiliter ferrugineo-pubescentibus mox griseo-pubescentibus demum glabrescentibus vel glabris. Inflorescentia axillaris et subterminalis, saepe foliosa cymoso-paniculata, quam folia brevior ad 4 cm. longa, ramulis breviter ferrugineo-tomentosis. Flores plerumque 3, intus extusque dense fulvo-pubescentes, 3 mm. longi, sessiles vel breve pedicellati, perianthii lobis ovatis 2 mm. longis. Fructus in sicco nigrescens, glaber, late subfusiformis, apice perianthii tubi reliquis coronatus, 8–10 mm. longus, ad 5 mm. latus pedicello aliquid crassato cicatricoso situs.

FRENCH INDO-CHINA: *Annam*: Station Agricole de Blao pro: du Haut Donai, *Poilane* 22294 (TYPE, P) alt. 800 m., April 12, 1933 (arbre de 10 m. de h. et de 0.40 m. diam., fl. non ecloses et fruits forêt); 21763 (P).

This species falls in Liou's¹ key in the section "fruit ovoid-oblong, not

¹ Liou, Laurac. Chine Indoch. 96. 1932.

longitudinally costate, with greyish inflorescences." Lecomte² mentions no species with leaves less than 10 cm. long except *C. lenticellata* Lcte., which bears costate fruit. The nearest relative of *C. annamensis* is *C. ferrea* Blume from Malaya, reported by Lecomte (l. c. 147) and Liou (l. c. 101) as occurring in Cambodia, Cochinchina and Laos. *Cryptocarya annamensis* has elliptic or elliptic-oblong leaves, obtusely acuminate to obtuse, glaucous below, 7–10 (–13) cm. long, 3–4 (–5.5) cm. broad. The lateral nerves number 4 or 5, whereas those of *C. ferrea* are 8 or 9 (–12–14). The petiole is 10–15 mm. long as opposed to 5–10 mm. long in *C. ferrea*. The inflorescence is up to 9 cm. long and densely flowered. The very young branchlets are rusty tomentose, soon becoming darkly short-pubescent, and finally glabrous and black. The fruits are small, black, ellipsoid, up to 10 m., attenuate at both ends (subfusiform). The last cited number has larger leaves but belongs to this species.

Lauromerrillia, gen. nov.

Arbores. Folia opposita vel alternata, simplicia, penninervia. Ramuli plus minusve robusti, plus minusve angulati. Inflorescentiae axillares, paniculatae, exinvolucratae. Flores hermaphroditi: perianthii lobi 6, aequales tubum brevem, connati cum appendiculis glandulosis alternantes, brevibus flabelliformibus, stamina 6, introrsi, lobis oppositi, antheris 2-loculatis, staminodii 3, lobis exterioribus oppositi, 1- ∞ forma magnitudine valde ludentibus quam caeteris minoribus; ovarium subglobosum stylo sat gracile.

Lauromerrillia appendiculata, spec. nov.

Arbor (4–)6–10(–20) m. alta, ramulis glabris, novellis plus minusve pubescentibus, teretibus inaequaliter striatis griseis robustis. Folia opposita vel alternata, elliptica vel obovalia, 4.5–10 cm. longa, 2–3.5 cm. lata, membranacea vel interdum subcoriacea, obtusa, obtuse acuminata, rotundata vel retusa, basi cuneata saepe attenuata, utrinque glabra, supra interdum nitida, in sicco viridescens, minute denseque glanduloso-punctata, graciliter prominenterque reticulata, penninervia, nervis lateralibus 7–9 obscuris gracilibus, costa supra leviter subtus prominenter elevata, petiolis ad 1 cm. longis glabris. Inflorescentia axillaris, paniculata, brevis, ad 2 cm. longa, pubescens, 12-flora, pedunculis 5–8 mm. longis. Flores $\pm$ 4 mm. longi, flavi (fide coll.), pubescentes, perianthii lobis 6, $\pm$ 3 mm. longis elliptico-lanceolatis membranaceis glanduloso-punctatis, tubo $\pm$ 1 mm., staminibus 6 lobis oppositis, staminodiis 3 triangularibus lobis exterioribus oppositis, 1- ∞ forma magnitudine valde ludentibus quam caeteris minoribus, ovarium subglobosum, stylo sat gracile, pedicellis gracilibus pubescentibus. Fructus immaturus viridis vel nigrescens, maturus caeruleus (fide coll.), lividus, glaber, consperse minuteque tuberculatus, obovoideus, immaturus apiculatus, 1.8 $\times$ 1 cm., pedicellis sat incrassatis ad 4 mm. longis 1.5 crassis nigrescentibus glabris.

HAINAN: Chim Fung Mt., near Fong Ngau Po Village, Kan-en District, *Lau* 5434 (TYPE fl., AA), fairly common dry steep slope, sandy soil, forest, Feb. 1–28, 1935 (erect tree 9 m. high, diam. 15 cm.; flower yellow); *Lei* 818 (fruit AA, USDA, USNH); *How* 70781, (AA, USNH), 73064 (AA); *Lau* 6 (AA, USDA, USNH), 1268, 1352, 1587, 1662, 1830, 3401, 3535, 3662, 26470 (AA).

² Lcte., Fl. Gén Indoch. 5: 144. 1914.

This species is similar superficially to those in the group with *Beilschmiedia erythrophloia*, but differs sharply in its minutely tuberculate fruit with a definitely obovoid rather than ellipsoid tendency, apiculate only in the young stage, and seated on a somewhat enlarged pedicel. The largest fruits and presumably the most mature are described as blue, whereas the smaller are green or black. The leaves are membranaceous with the lateral veins almost completely obscured by the delicate, loose, raised reticulation. The greenish twigs are unevenly and coarsely striate. The flowers are rather large, 4 mm. in length, and campanulate, with six membranaceous lobes opposite which are six large stamens over 2 mm. long. The introrse anthers possess two large pores and are borne on slender filaments. In the sinus of each lobe is a small flabelliform sessile staminodium or gland. Opposite the three exterior perianth lobes are triangular, shortly stipitate staminodia. Scattered helter-skelter below, around the tube, are a few variously shaped staminodia, stipitate or sessile. The ovary is subglobose with a somewhat slender style once and a half again as long as the ovary. The flower structure does not conform in parts or number of parts to any known genus of the Lauraceae. Vegetatively the specimens fit very nicely into the genus *Beilschmiedia*. As far as the fruit is concerned, the Hainan material might possibly belong to *Beilschmiedia* or *Endiandra*. It is a question of how much latitude may be permitted when one is dealing with floral structure. In the Hainan genera studied previously (*Cinnamomum*, *Neocinnamomum*, *Litsea*, *Neolitsea*, *Actinodaphne*, and *Lindera*) there has been a remarkable consistency in the floral structure. It is only in *Cryptocarya*, *Beilschmiedia*, and *Endiandra* that a variation in number and structure is apparent.

Prof. I. W. Bailey, of the Biological Laboratories of Harvard, very kindly examined the type and pronounced it to be lauraceous in respect to the anatomy of its pollen, leaves and stem. He also states: "The six organs which alternate with the lobes of the perianth differ somewhat in form from the three staminodia but are of fundamentally similar structure. In other words, they appear to me to resemble structures that have been interpreted as staminodia in the flowers of other Lauraceae."

The genus is named in honor of Dr. E. D. Merrill, Director of the Arnold Arboretum, whose work on the flora of Hainan is outstanding.

Endiandra R. Br.

Endiandra hainanensis Merr. & Metc., spec. nov.

Arbor ad 8 m. alta, ramulis glabris, novellis pubescentibus, minutissime glandulosis teretibus, novellis sat angulatis, striatis brunnescentibus. Folia alternata, lanceolata vel oblongo-elliptica, ad 15 cm. longa, 5 cm. lata, pergamentacea, obtusa, attenuate obtusa vel obtuse acuminata, basi cuneata, saepe obliqua, utrinque glabra, minute denseque glanduloso-punctata, utrinque dense conspicuissimeque reticulata, penninervia, nervis 6–8 supra inconspicuis subtus leviter elevatis, costa supra sat subtus conspicue elevata, petiolis 1–1.5 cm. longis glabris. Inflorescentia axillaris, paniculata, ad 6 cm. longa, glabrescens, pauciflora, pedunculis ad 1 cm. longis gracilibus

glabrescentibus mox glabris. Flores 3.5 mm. longi, glabri, perianthii lobis ovalis carnosus, staminibus 3, pseudoconnatis. Fructus in sicco purpureo-brunnescentis, inconspicue costatus, glaber, attenuate oblongus, apice obtusus, ad 3.8×1.4 cm., pedicellis incrassatis ad 5 mm. longis 2 mm. crassis griseis vel atro-rubrescentibus glabris.

HAINAN: Po-ting, *How* 72977 (TYPE fl., AA), alt. 330 m., in forested ravine, June 24, 1935 (tree 8 m., bark grey; leaf lustrous green above, paler beneath; flower pale yellow, anthers opening by valve, slightly fragrant); *Lei* 46 (fruit, AA).

The new species from China is near *E. coriacea* Merr. from the Philippines and an apparently unpublished species from Formosa, but differs from the former in having thinner leaves and longer, attenuated fruit with shorter, less enlarged pedicels, smaller flowers, and inflorescences not ferrugineous tomentose. From the latter it differs in leaves more oblong than elliptic, more finely reticulate, and branchlets less robust.

Syndiclis Hook. f.

Syndiclis chinensis, spec. nov.

Arbor 10(-12) m. alta, ramulis glabrescentibus, novellis ferrugineo-tomentellis, lenticellatis teretibus striatis brunnescentibus. Folia opposita vel alternata, ovata vel elliptica, 6-10 cm. longa, 2.5-5.5 cm. lata, coriacea, acuminata, acuta vel obtusa, saepe obliqua, utrinque glabra vel subtus glabrescentia, novellis subtus pubescentibus?, subtus glauca, minute alveolata, penninervia, nervis 3-5 et costa brunnescentibus, supra impressis subtus elevatis, petiolis ad 1.5 cm. longis brunnescentibus glabrescentibus. Inflorescentia axillaris, paniculata, ad 4 cm. longa, ferrugineo-tomentosa, pauciflora, pedunculis brevibus. Flores 1.5 mm. longi, viridescens-flavi (fide coll.), ferrugineo-tomentosi, perianthii lobis 4 ovalibus, staminibus 4 paullo exsertis, sessilibus introrsis 2 exterioribus bi-glandularibus, staminiidiis 4 pubescentibus staminibus oppositis; ovarium ovoideum stylo attenuatum, pedicellis brevibus ad 1.5 mm. longis. Fructus illustre viridis (fide coll.), in sicco atro-rubescens, glaber, turbinatus, cicatrice oblique, 3.5×3 cm., basi 1 cm. crassus, pedicellis pedunculis confusis incrassatis ad 4 cm. longis et 1 cm. latis ferrugineis striatis glabris.

HAINAN: Po-ting, *How* 73136 (TYPE fl., fruit, AA), alt. 480 m. in forested ravine, July 8, 1935 (tree 10 m. high, bark brown; leaf lustrous green above, paler beneath, coriaceous; flower greenish yellow; fruit lustrous green); *Wang* 34657 (AA).

The genus was set up in 1886 by Hooker f., *Icones* 16: 1516. 1886, and *Fl. Brit. Ind.* 5: 127. 1886, from Booth's flowering specimen from Bhotan, Himalaya. The name *Syndiclis* refers to the single valve of the anther, doubtless presumed to have been formed by the fusion of the usual two. This characteristic, plus the four perianth lobes and stamens, was the basis of separating it from *Endiandra*. *Syndiclis chinensis* differs from *S. paradoxa* Hook. f., from India in having the young branchlets ferruginous tomentose instead of white or pubescent, leaves 3-4 inches long and $2-2\frac{1}{2}$ inches wide with usually 4 pairs of veins instead of 4-5 inches by $1-1\frac{1}{2}$ inches with 10-12 pairs of veins, the inflorescence ferruginous tomentose (there is no mention of this condition in *S. paradoxa*), and anthers with two valves instead of one. The fruit of *S. paradoxa* is unknown. Koster-mans, *Not. Syst.* 8: 73. 1939, has discussed the relationship of *Syndiclis*

to the genus *Potameia* Thouars from Madagascar. The only difference he finds is the single locule of *Syndiclis paradoxa*, which he contends appears as two before dehiscence, and at dehiscence becomes confluent. Having myself in other genera found various stages of confluence of valves (see Allen, Jour. Arnold Arb. **23**: 149. 1942) I am inclined to agree with Kostermans that this character is insufficient to maintain *Syndiclis* as a distinct genus. The distribution, although unusual, is not entirely unknown. For example, *Erythrophloeum* in the Leguminosae is predominantly African, with one species each from Australia, China and Indo-China. Other genera, such as *Baphia*, also a legume, and *Combretodendron* in the Lecythidaceae, occur in Africa or Madagascar with an isolated species or so in the Philippines or Malaya.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

STUDIES IN THE THEACEAE, XIII
NOTES ON THE MEXICAN AND CENTRAL AMERICAN
SPECIES OF *TERNSTROEMIA*

CLARENCE E. KOBUSKI

THIS presentation of the Mexican and Central American species of the genus *Ternstroemia* is the second portion of a study of the New World species of the genus. The results of the work on the South American species were published in the Journal of the Arnold Arboretum, **23**: 298–343. 1942, and a study of the West Indian species will appear in the near future. Since the species of *Ternstroemia* in the Western Hemisphere are generally quite localized, one may roughly divide them into three geographical groups for study, namely, those of (1) the West Indies, (2) Mexico and Central America, and (3) South America. The North American groups were taken up first. After a very discouraging attempt at classification, the Mexican and Central American species were temporarily laid aside and the South American species studied instead. This proved to be a very fortunate move because, although many more species had been described and recognized in South America, these latter species exhibited characters which were more clearly distinct and consistent for specific delimitation. This knowledge aided considerably in the later classification of the Mexican and Central American species, many of which were described and based upon a single, extremely variable character. In fact, in contrast with the species of South America, there is throughout all the species of Mexico and Central America a certain sameness in the characters which might be used for specific delimitation.

This leads one to believe that the center of distribution for the genus in the Western Hemisphere lies in northern South America, where there is an abundance of very different species, and that all the Central American and Mexican species are very closely related and probably are derived from the same, not too remote, prototype. This latter assumption may be applied, for the most part, to the West Indian species also. However, there are more true species with definite outstanding characters in the West Indies than in Central America.

In most cases, throughout the genus, the species are rather localized, being confined to small but definite geographical localities. At the northern limits of the range are found two very variable species. In Mexico and Central America there is *T. Tepezapote* Schlecht. & Cham., ranging from southern Mexico into Nicaragua. Although several species have been described as differing from this original form, few present characteristics sufficiently distinct to permit specific recognition. The same holds true for *T. peduncularis* DC. in Cuba and southward through the West Indies. This latter species is better known under the name *T. obovalis* Rich., which

name one would naturally prefer retaining. However, *T. peduncularis*, although previously not well known, was described twenty-three years prior to *T. obovalis*.

Since a formal description was presented in the early part of the South American treatment, it hardly seems worthy of repetition here. However, immediately below is a brief discussion of the various characters used in specific delimitation throughout the genus. The differences which aided so much in the work on the South American species are shown. At the same time, the sameness of characters in the North American species is brought out. This "sameness" or lack of characters led to the assumption that these latter species had been derived from a single very recent prototype.

Leaves: In general, throughout the whole genus *Ternstroemia*, the leaves seldom furnish sound specific characters. The phrase "leaves coriaceous, obovate, crowded at the apex of the branchlets" may be applied to most species. From this characterization there is little variation to be found in the North American species. In one species, *T. sylvatica* (Vera Cruz), the leaves are definitely chartaceous or submembranaceous, and distinctly acute at the apex. A second species, *T. Pringlei* (Southern Mexico), has leaves which are always spathulate and consistently rounded at the apex.

Pedicels: The pedicel length, unless either very short (0.5 mm. or less) or very long (4–8 cm.) is hardly to be used as a distinctive specific character. Occasionally, on the large-fruited species of South America and Polynesia, the pedicels may be very stout (5 mm. diameter) at the apex, but ordinarily they scarcely exceed 2 mm. in diameter. In some instances, the pedicels may be somewhat flattened. This again is a rather inconsistent feature.

Bracteoles: The bracteoles, two in number (rarely four), often present good delimiting characters. They are always unequal in size, generally opposite and situated on the pedicel immediately below the calyx-lobes. In rare instances they may be alternate, with the outer bracteole two or even four millimeters below the calyx-lobes. Frequently the bracteoles appear to be caducous. Neither this latter character nor the alternate position of the bracteoles are consistent. At times, especially in the Mexican species, both alternate and opposite bracteoles with their corresponding positions may be found on a single specimen. In size and shape the bracteoles vary more, perhaps, than in any other individual character. An excellent example of this variation within a single species may be found in *T. Tepezapote*, native of Mexico and Central America. Variations from minute deltoid bracteoles through larger ovate and broadly ovate ones to even larger subrotund forms may be found. Nearly always, the bracteoles are glandular-denticulate. Often, in the very small forms, only a single denticulation may be found.

Calyx: The calyx-lobes, always persistent, offer one of the best and most used characters for differentiation. In the South American species many

different forms, including variations in size, shape, texture and the presence or absence of glandular-denticulations are used to complete satisfaction. In all species, the calyx-lobes are unequal, varying in size and shape from the smaller outer lobes to the larger inner lobes. Glandular denticulations are found only on the two outer lobes and occasionally on the exterior side of the middle lobe. The two inner lobes possess an entire and usually more scarious margin than the outer lobes. In the Mexican and Central American species, little variation is found in this character. All are of the same form and texture, usually rounded with little variation at the apex. Frequently the innermost lobes may be slightly apiculate.

Corolla: The petals, so often absent in herbarium specimens, cannot be relied upon for specific delimitation. They are usually about the same length as the calyx-lobes. Ordinarily they are white or yellowish white in color. A distinct difference in color is found in *T. Standleyana*, where the petals are always pink on the outer surface and red on the inner surface. Urban, in his treatment of the West Indian species, used extensively the character of connation of the base of the petals. In a few of the South American species, especially in *T. globiflora*, where the corolla is nearly cleistogamous, this character is very significant. However, in the Central American and Mexican species, the lobes are usually connate for one-half or a trifle less than one-half their length and vary slightly in this respect.

Stamens: The stamens are usually arranged in two series, only occasionally in one or in more than two series. The filaments are joined together (usually their entire length) and, in turn, are adnate to the base of the corolla. The anthers are usually linear. The connective is projected into an appendage extending beyond the anthers. In the North American species, there is little or no variation in the stamens. In the South American species, the character of the projected connective often presents excellent specific significance.

Pistil: In the pistil occur some of the best delimiting characters. In the South American species and those of the West Indies are found excellent characters for differentiation in the shape and number of cells of the ovary. Two-celled ovaries are the most typical and are present in the majority of species. However, several species in South America and two species in the West Indies have three-celled ovaries. It is interesting to note that the two West Indian species, *T. elliptica* and *T. delicatula*, having three-celled ovaries are confined to the southern islands of the Antilles and that *T. delicatula* is the only species extending into the West Indies from South America. Other species in South America have ovaries with four, five, or even six cells, these conditions usually resulting from incomplete doubling up of the two- or three-celled ovaries. Two species from South America, *T. Gleasoniana* and *T. discoidea*, and one species from the West Indies, *T. parviflora*, have supposedly one-celled ovaries. On the other hand, all the Mexican and Central American species possess two-celled ovaries, and furthermore both cells of the ovary always contain five or six

ovules. In the West Indian and South American species, one finds considerable differences in the number of ovules in the cells of the ovary.

The shape of the ovary and the subsequent shape of the fruit have been misused as characters of separation in the Mexican species. At anthesis, most species have flat, almost umbonate ovaries, seldom over 2 mm. long and up to 5 mm. diameter at the base. This type of ovary develops into a conical fruit. On occasional specimens stages of this development may be observed. It appears as though the apical portion of the ovary develops almost immediately and continues to maturity. In Mexico and Central America, most species have fruit definitely conical in shape, although the degree of angle may vary considerably. Various specimens, such as the type of *T. oocarpha* Rose, have very pronounced conical fruit when compared with the majority of other specimens. However, to my mind, the degree of variation in the fruit of *T. Tepezapote* is so gradual and still so extensive that *T. oocarpha*, although very distinctive in the type, must be included under the binomial *T. Tepezapote*, at least from this characteristic.

The style and stigma in the Mexican and Central American species offer no variations in form or size. In all specimens examined, the style is entire, 4-8 mm. long, and the stigma is punctiform. In the other two geographic regions, the style may be consistently very short (1 mm. in *T. brevistyla* Kobuski and *T. Mutisiana* Kobuski) or very long (10 mm. in *T. dura* Gleason and *T. olaeafolia* Wawra); occasionally it may be two-parted, as in *T. tristyla* Gleason, *T. distyla* Kobuski and *T. grandiosa* Kobuski, or three-parted, as in *T. punctata* Swartz. Excellent characters were found in the stigma. Besides the punctiform type, peltate, bi-peltate, crenate and capitate stigmas were found to aid in specific differentiation.

KEY TO THE SPECIES

A. Outer calyx-lobes entire, eglandular.

B. Leaves not retuse at apex, inconspicuously veined on upper surface or slightly elevated, not impressed.

C. Pedicels 3-6 cm. long, sturdy, 3 mm. diam. at apex; bracteoles alternately disposed on pedicel (Maria Madre Island).....1. *T. Maltbyi*.

CC. Pedicels not over 3 cm. long; bracteoles opposite, just below calyx-lobes.

D. Petals red on internal surface, pink on external surface (Costa Rica)....
.....2. *T. Standleyana*.

DD. Petals white or creamy white.

E. Leaves spathulate, rounded at apex, two or three times longer than broad, long-tapering from middle to base; bracteoles generally caducous (Mexico).....3. *T. Pringlei*.

EE. Leaves obovate, often oblong-obovate, obtuse at apex, occasionally bluntly acuminate, tapering from middle but not gradually; bracteoles persistent (Panama).....4. *T. Seemanni*.

BB. Leaves retuse at apex, with veins impressed on upper surface.

C. Leaves oblong-obovate, 5.5-9.5 cm. long, 1.5-2.0 cm. wide, obtuse or acute at apex, tapering at base; veins lightly impressed above (Chiapas).....
.....5. *T. chalicophila*.

CC. Leaves rounded to obovate, 2.5-6.5 cm. long, 1.5-3.0 cm. wide, rounded or obtuse at apex, broadly cuneate at base; veins deeply impressed above, as if etched (see also AA) (Chiapas).....6. *T. impressa*.

AA. Outer calyx-lobes glandular-denticulate.

B. Veins deeply impressed, as if etched, on the upper surface of the leaves (See also A) (Chiapas) 6. *T. impressa*.

BB. Veins inconspicuous or lightly raised on upper leaf surface.

C. Leaves elliptic, acuminate, chartaceous; pedicels short, less than 1 cm. long (Mexico) 7. *T. sylvatica*.

CC. Leaves obovate, coriaceous; pedicels 1.0–2.5 cm. long.

D. Larger bracteoles orbicular, 5–6 mm. long, 4–5 mm. wide; calyx lobes 10–11 mm. long, ca. 11 mm. wide; petals 11–12 mm. long, 7–10 mm. wide (Honduras) 8. *T. megaloptycha*.

DD. Bracteoles seldom more than 4 mm. long and 3 mm. wide; calyx-lobes not over 8–9 mm. long and 6–8 mm. wide; petals ca. 8 mm. long and 4 mm. wide (Mexico, Guatemala, British Honduras, Honduras, Salvador, Nicaragua) 9. *T. Tepetzapote*.

1. ***Ternstroemia Maltbyi*** Rose in North Amer. Fauna, **14**: 78. 1899, as "*T. Maltbya*." *Taonabo Maltbyi* Rose in Contrib. U. S. Nat. Herb. **8**: 322. 1905.

Ternstroemia Maltbyana Standley in Contrib. U. S. Nat. Herb. **23**: 823. 1923. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925.

Taonabo Maltbyana Standley in Contrib. U. S. Nat. Herb. **23**: 823. 1923, in synonym.

DISTRIBUTION: Mexico (Maria Madre Island, Sinaloa).

MEXICO: Maria Madre Island, gravelly arroyo, *T. S. Maltby* 105 (TYPE, US), May 12, 1897. — Maria Madre Island, *E. W. Nelson* 4242 (PARATYPE, US; ISOTYPES, FM, G), May 3–25, 1897. — Sinaloa, near Colomas, *J. N. Rose* 1675 (US), July 14, 1897.

Branchlets grayish, verticillate. Leaves coriaceous, oblong-obovate, 5–11 cm. long, 3–5 cm. wide, obtuse or subrotund at apex, tapering at base, granular-punctate on both surfaces, the margin entire, plane, the midrib canaliculate above, the 5–7 pairs of veins rather obscure on both surfaces, the petiole 7–8 mm. long. Pedicel 3–6 cm. long, sturdy, as much as 3 mm. diam. at apex; bracteoles 2, quite equal, long-ovate, ca. 2 mm. long, 1.5 mm. wide, apiculate, subcarinate, the margin sharply glandular-denticulate, alternately disposed on the pedicel 4–5 mm. below calyx-lobes, generally caducous; calyx-lobes imbricate, pergamentaceous, subequal, the outer lobes quite rounded, ca. 9 mm. long and wide, the margin entire and scarious, the inner lobes broadly ovate or elliptic, ca. 9 mm. long and 7 mm. wide; petals ovate, 10–11 mm. long, 5–6 mm. wide, involute toward apex, joined at base for 4 mm.; stamens ca. 60, bi-seriate, 5 and 7 mm. long, the filaments 1.5–2.0 and 3+ mm. long, the shorter filaments crassate, the longer filaments linear, the anthers in both ca. 3+ mm. long and the connective projected about 1 mm.; ovary conical, ca. 5 mm. long and 5 mm. diam. at base, 2-celled with 5 ovules in each cell, the style 8 mm. long, the stigma punctiform. Fruit (probably immature) oval to rounded, 2 cm. long and 2 cm. diam., the seeds 10 mm. long and 6 mm. wide.

Distinguishing features of this species are the long pedicels (up to 6 cm.), the large, round, entire calyx-lobes and the large petals. Also the caducous bracteoles, consistently alternate on the pedicel, are unusual.

Rose, in his original description (1899), used the name *Ternstroemia Maltbya* for this species. In 1905, he made the new combination *Taonabo Maltbyi*, correcting the original spelling in both the species and the synonym, *Ternstroemia Maltbyi*. Standley (1923), assuming that Rose originally intended to use the name *Ternstroemia Maltbyana*, made this new combination and for the synonym made still another combination, *Taonabo*

Maltbyana. However, since Rose himself corrected the original spelling "Maltbya," which was grammatically incorrect, to "Maltbyi" in both the species and the synonym, one must accept the name and assume that, even though no actual reference was made to the change, the author intended it so.

2. ***Ternstroemia Standleyana*, sp. nov.**

Frutex vel arbor parva, 3–6 metralis, ramulis verticillatis teretibus griseis. Folia chartacea vel subcoriacea, obovata vel oblanceolata, 7.5 cm. $\times$ 3 cm. vel 9 cm. $\times$ 2.5 cm. vel 6.5 cm. $\times$ 1.5 cm., apice obtusa, abrupte acuta vel acuminata, basi longo-attenuata, margine integerrima, plana vel subrevoluta, costa supra canaliculata, ad apicem evanida, venis undique inconspicuis, petiolis ca. 5 mm. longis. Pedicelli tereti, 1.5–2.3 cm. longi, bracteolis 2 inaequalibus ovatis 4.0 mm. $\times$ 3.5 mm. vel 3.5 mm. $\times$ 2.5 mm. vel 3.0 mm. $\times$ 2.5 mm. integerrimis subcarinatis; sepala 5, imbricata, subaequalia, ovata, 9.5–10 cm. longa, exterioribus 5–6 mm. latis margine integerrimis et scariosis, interioribus 7–8 mm. latis, intimo apice apiculato; petala 5, ovata, extus rosea, intus rubra, ca. 10 mm. longa et 4 mm. lata, basi ad 2–4 mm. connata, apice acuta et involuta; stamina ca. 35, uni-seriata ut videtur, 5–7 mm. longa, filamentis 2.0–2.5 mm. longis, incrassatis, basi connatis et ad corollam adnatis, antheris linearibus vel subsagittatis, luteis, 4.0–4.5 mm. longis, connectivo in apiculum 0.5 mm. longum projecto; ovario late conico, 2 mm. longo et basi 3 mm. diam., 2-loculato, loculis 4–5-ovulatis, stylo ca. 6 mm. longo, stigmatibus punctiformi. Fructus conicus, 2-loculatus, probabiliter immaturus, 2.0 cm. longa, 1 vel 2 cm. lata, seminibus 1–3, grandis 1.2–1.5 cm. longis et 0.8–1.0 cm. diam., testa pallide lutea, arillo detergibili rubro-brunneo subcarnosa sub lente papillato induta.

DISTRIBUTION: Costa Rica.

COSTA RICA: Prov. Cartago: Alto de La Estrella, bushy slope, *P. C. Standley* 39279 (US; fragm. FM), March 1924 (shrub 3 ft. with green fruit). Prov. San José: Northeast of El Copey, near Laguna de la Escuadra, dense oak and bamboo forest, alt. 2000–2200 m., *P. C. Standley* 41914 (US), 41945 (FM, TYPE; US, ISOTYPE), Dec. 16, 1925 (common tree 4–6 m.; petals pink outside, red within; anthers yellow). — Laguna de la Chonta, northeast of Santa Maria de Dota, dense wet forest, alt. 2000–2100 m., *P. C. Standley* 42209 (US), 42274 (US; fragm. FM), Dec. 18, 1925 (common tree 4–6 m.; buds pink; petals red within; fruit green). — Near Quebradillas, about 7 km. north of Santa Maria de Dota, moist oak forest, alt. 1800 m., *P. C. Standley* 42991 (US), 43041 (US; fragm. FM), Dec. 24, 1925 (shrub or small tree 3.0–4.5 m. high; flowers pink outside, red within).

This excellent new species is characterized by large unequal bracteoles, up to 4 cm. long and 3.5 cm. wide, which are much larger than those of its nearest relative, *T. Seemanni*. The calyx-lobes (nearly 10 mm. long) and petals (also 10 mm. long) are considerably larger than those of *T. Seemanni*. In fact, the flowers of the present species measure over 2 cm. across when expanded. The petals of this species are consistently pink on the outside and red within, as contrasted with the yellowish white petals of *T. Seemanni*. The stamens are uni-seriate (35 in number) and 7.5 mm. long in *T. Standleyana*, while in *T. Seemanni* the stamens are bi-seriate (50 in number) and much smaller in size. The branchlets on *T. Standleyana* are gray in color while in *T. Seemanni* the branchlets are red.

It is a pleasure to dedicate this species to Mr. Paul C. Standley, Curator of the Herbarium of Field Museum of Natural History, long recognized as an outstanding worker in the Central American flora and an indefatigable collector of tropical plants. This is truly Mr. Standley's species, considering that all six specimens cited above were collected by him.

3. **Ternstroemia Pringlei** (Rose) Standley in Publ. Field Mus. Nat. Hist. Bot. Ser. 4: 234. 1929.

Taonabo Pringlei Rose in Contrib. U. S. Nat. Herb. 8: 322. 1905. — Standley in Contrib. U. S. Nat. Herb. 23: 821. 1923.

DISTRIBUTION: Mexico (Morelos, Michoacan, Mexico, Oaxaca).

MEXICO: Morelos: Sierra de Tepoxtlán, alt. 2300 m., *C. G. Pringle* 8013 (TYPE US; isotype, AA, G, Mich, Mo, NY), March 18, 1899 (small tree). — Woodlands about Alarcon Station, alt. 1800 m., *C. G. Pringle* 11932 (FM, G, US), June 17, 1904. — Huitzilás, *E. Lyonnet* 645 (AA, Mo, NY, US), Dec. 1930. — Near El Mirador, on road from Cuernavaca to Mexico, alt. 2200 m., *L. O. Williams* 3819 (G), May 19, 1938 (tree). — Near Cuernavaca, *J. N. Rose & W. Hough* 4406 (US), May, 1899. Michoacan: Vicinity of Morelia, Campanario, alt. 2100 m., *Bro. G. Arsène* 5708 (AA, FM, G, Mo, US), Nov. 17, 1910. — Cerro Azul alt. 2100 m., *Bro. G. Arsène* 2287 (AA, Mo, US), Nov. 4, 1909. — La Huéta, alt. 2200 m., *Bro. G. Arsène* s.n. (FM), Oct. 1910. — Hills of Patzcuaro, alt. 2550 m., *C. G. Pringle* 5353 (G, US), July 29, 1892. — North slope of Mt. Tancitaro, alt. 2300–2750 m., *E. W. Nelson* 6894 (G, US), Feb. 24, 1903 (tree 25–40 ft. with white flowers). Mexico State: Temascaltepec: Las Mesas, Rincón and Cumbre, alt. 2000–2800 m., *G. B. Hinton* 3728 (FM), 5606 (AA, FM, NY), 5914 (AA, FM, NY), Apr. 25, 1933–Apr. 29, 1934 (small tree to 10 m. high; vernacular name, "trompillo"). Oaxaca: Teotepec, alt. 2500 m., *G. B. Hinton* 14239 (NY), May 19, 1939 (tree 10 m. high with white flowers, in oak and pine forest).

Small tree with brownish branchlets. Leaves coriaceous, oblanceolate to oblong-cuneate, 6–9 cm. long, 1–2 (–3) cm. wide, obtuse at apex, long tapering from middle to base, granular-punctate on both surfaces, the margin subserrulate or subentire toward apex, subrevolute and plane toward base, the midrib canaliculate above, elevated below, the veins (5–7 pairs) rather obscure above, when visible elevated, visible below, the petiole 5–10 mm. long. Flowers usually axillary, solitary; pedicel 1.0–2.5 cm. long; bracteoles 2, lanceolate, 3.5–5.0 mm. long, quickly caducous, when present usually opposite and immediately below calyx-lobes, occasionally alternate (in type) with lower bract 2–3 mm. below calyx; calyx-lobes imbricate, subequal, pergamentaceous, the outer lobes broadly ovate, ca. 9 mm. long and broad, the margin entire and scarious, the inner lobes broadly ovate, apiculate; petals white, orbicular or suborbicular, 1.0–1.3 cm. long, 1.0–1.2 cm. wide, free nearly to base (2 mm.), the corolla large (for Mexican species), as much as 2.5 cm. diam.; stamens ca. 60, bi-seriate, 5 and 7 mm. long, the shorter stamens with filaments swollen at base, 2 mm. long, the longer stamens with filaments less swollen, 4 mm. long, the anthers in both series ca. 2 mm. long with the projection 1 mm. long and sharply apiculate; ovary conical, ca. 3 mm. long and 5 mm. diam. at base, 2-celled with ca. 5 ovules in each cell, the style 7 mm. long, the stigma punctiform. Fruit elongate-conical, ca. 1.5 cm. long and 1 cm. diam., the seeds up to 8 mm. long and 5 mm. wide.

The outstanding feature of this species is the shape of its oblanceolate or oblong-cuneate leaves, obtuse or generally rounded at apex, and long tapering at base. The margin of the leaves is usually subserrulate or at

least with some evidence of denticulation. Most closely related is *T. chalicophila* Loesener, which can be separated by having its leaves obovate, hardly oblanceolate, distinctly serrulate, retuse at the apex, and with veins impressed above. The bracteoles in this latter species are smaller (2 mm. long), deltoid and definitely alternate, placed as low as 7 mm. on the pedicel away from the calyx-lobes, which are more rounded and smaller (as are probably the petals). In both species the bracteoles are quickly caducous.

4. ***Ternstroemia Seemanni*** Triana & Planchon in Ann. Sci. Nat. sér. 4, **18**: 260. 1862. — Alfara, List Pl. Costa Rica, 11. 1887. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142. 1925. — Standley in Contrib. Arnold Arb. **5**: 107 (Fl. Barro Colorado Isl.). 1933.

Ternstroemia peduncularis Seemann, Bot. Voy. Herald. 87. 1853. — Non *T. peduncularis* DeCandolle.

Mokofua Seemanni (Triana & Planchon) O. Kuntze, Rev. Gen. Pl. **1**: 63. 1891.

Taonabo Seemanni (Triana & Planchon) Standley in Jour. Washington Acad. Sci. **15**: 459. 1925.

DISTRIBUTION: Panama.

PANAMA: *B. Seemann* 525 (ISOTYPE, G), March 1847. — *Duchassaing s.n.* (ISOTYPE, G). Prov. Colon: Chagres, *A. Fendler* 315 (ISOTYPES, FM, G, Mo, US), March 24, 1850. — Loma de la Gloria, near Fato, in forests, alt. 10-104 m., *H. Pittier* 4079 (NY, US), Aug. 1911. Prov. Coclé: Between Las Margaritas and El Valle, *R. E. Woodson, P. H. Allen & R. J. Seibert* 1300 (FM, NY), July-Aug. 1938 (tree 15 m.). — Penonome and vicinity, *R. S. Williams* 374 (NY, US), Feb.-March 1908 (tree 20 ft. with yellowish white flowers). Prov. Panamá: Thickets and forests near Arraiján, alt. 15 m., *R. E. Woodson, P. H. Allen & R. J. Seibert* 1340 (FM, Mo, NY), July 21, 1938 (tree 10 m.). — Arraiján, in dense shade, alt. 50 m., *P. H. Allen* 732 (FM, G, NY), Apr. 11, 1938 (slender tree 10 m.; flowers pale tan). — Juan Diaz, moist woods, *P. C. Standley* 30585 (US), Jan. 11, 1924 (shrub or tree 10-20 ft. with dark green leaves). — Sabanas north of Panama City, *Bro. Paul* 416 (US), in 1934. Barro Colorado Island: West Shore, *C. L. Wilson* 132 (FM), Feb.-March 1931 (medium-sized tree). — Along shore near Zetek House, *R. H. Woodworth & P. A. Vestal* 686 (AA, FM), Feb. 24, 1932 (tree). — Along French Canal, *O. Shattuck* 783 (FM), Gross Point, *O. Shattuck* 860 (FM), Pena Blanca Bay, *O. Shattuck* 1092 (FM), shore near Zetek House, *O. Shattuck* 1159 (FM), 1932-1934.

Small tree. Branchlets reddish, terete, quite smooth. Leaves chartaceous to subcoriaceous, oblanceolate or oblong-obovate, 6-11 cm. long, 2-4 cm. wide, obtuse at apex, contracted into an obtuse acumens, long tapering at base, granular-punctate on both surfaces, the margin subcrenulate, plane or subrevolute, the midrib canaliculate above, raised below, the veins generally obscure on both surfaces, occasionally 10-15 pairs lightly raised on both surfaces, the petiole 4-6 mm. long. Pedicel 2-3 cm. long; bracteoles 2, opposite, immediately below the calyx-lobes, unequal, very small, rounded, broadly ovate or ovate, 1.0-2.5 mm. long, 2-3 mm. wide, the margin entire or subentire; calyx-lobes imbricate, suborbicular, the outer lobes 4-7 mm. long, 5-6 mm. wide, the margin scarious, entire or nearly so, not glandular-denticulate, the inner lobes 6-8 mm. long, ca. 6 mm. wide, apiculate at apex; petals ovate, 6-7 mm. long, 2-3 mm. wide, acute at apex, joined for 2-3 mm. at base; stamens ca. 50, bi-seriate, 4-5 mm. long, the filaments ca. 1 mm. long, joined at base and adnate to base of corolla, the anthers narrow-linear, ca. 2 mm. long, the connective projected into an appendage 1.0-1.5 mm. long; ovary umbonate at first, 2 mm. long, 4 mm. diam. at base, 2-celled, each cell about 5-ovulate, the style 4-5 mm. long. Fruit subconical

to conical, ca. 1.5 cm. long, 1.0–1.3 cm. diam. at base; seeds 7–8, red-brown, filling capsule completely, 8–10 mm. long, 5–6 mm. diameter.

This species is characterized by chartaceous or subcoriaceous, oblanceolate leaves, reddish branchlets, entire calyx-lobes, and very minute bracteoles, persistent and opposite.

5. ***Ternstroemia chalicophila*** Loesener in Bull. Herb. Bois. sér. 2, **3**: 213. 1903. — Melchior in Nat. Pflanzenfam. ed. 2, **21**: 143. 1925.

DISTRIBUTION: Mexico (Chiapas).

MEXICO: Chiapas: on calcareous slope above Huitztan, *E. Seler* 2276 (ISOTYPE, G), March 10, 1896.

Branchlets rough, gray-brown. Leaves coriaceous, oblong-obovate, 5.5–9.5 cm. long, 1.5–2.0 cm. wide, obtuse or acute at apex, always retuse, tapering at base, granular-punctate on both surfaces, the margin flat and serrulate toward apex, slightly revolute and entire toward base, the midrib canaliculate above, the veins (5–7 pairs) obscure, impressed above and lightly raised below, the petiole 3–6 mm. long. Flowers axillary, solitary, the pedicel ca. 2 cm. long, thickened near the apex; bracteoles 2, alternate, on pedicel 2–4(–7) mm. below calyx, deltoid, ca. 2 mm. long, glandular-denticulate, quickly caducous; calyx-lobes imbricate, pergamentaceous, subequal, the outer lobes orbicular, 6–7 mm. long and wide, the margin entire, the inner lobes orbicular, only slightly larger, entire; petals (fide Loesener) oval, joined probably 1–2 mm. at base, 1 cm. diam. at apex; stamens (fide Loesener) 5 and 7–8 mm. long, the filaments thickened at base, the anthers with a deltoid acute projection; ovary (after anthesis) conical, ca. 4 mm. long and 4.5 mm. diam. at base, 2-celled with 5–7 ovules in each cell, the style 5–6 mm. long, the stigma punctiform.

The outstanding feature of this species are (1) the small (2 mm. long) quickly caducous bracteoles; (2) the alternate position of the bracteoles on the pedicel, usually 2–4 and occasionally as much as 7 mm. below the calyx-lobes; (3) the narrow obovate serrulate leaves, retuse at the apex with impressed veins on the upper surface and (4) the eglandular calyx-lobes.

Standley (Contrib. U. S. Nat. Herb. **23**: 821. 1923) and Melchior (Nat. Pflanzenfam. ed. 2, **21**: 143, 1925) both intimate that this species and *T. Pringlei* (Rose) Standley are conspecific. If such were the case the name *T. chalicophila* would have priority by two years. However, the leaves in *T. Pringlei* are truly oblanceolate, never retuse at the apex, occasionally serrulate with the veins raised rather than impressed on the upper surface. The bracteoles, when present, are lanceolate, 3–5 mm. long, generally opposite and close to the calyx-lobes. However, in the type and in other occasional specimens, the bracteoles may be alternate with the lower bracteole about 2–3 mm. below the calyx. In both species the bracteoles are quickly caducous and the calyx-lobes are entire.

6. ***Ternstroemia impressa*** Lundell in Bull. Torrey Bot. Club, **66**: 599. 1939.

DISTRIBUTION: Mexico (Chiapas), Guatemala.

MEXICO: Chiapas: Chiquihuite, Mt. Tacana, alt. 2800 m., *E. Matuda* 2814 (TYPE, Mich; isotype, NY), March 27, 1939. — Pico de Loro, Barranca Honda, Siltepec, alt. 2600 m., *E. Matuda* 4077 (AA, Mich), Oct.–Nov. 1940 (shrub).

GUATEMALA: Dept. Huehuetenango, Soloma, alt. 3000 m., *A. F. Skutch* 993 (AA), August 17, 1934 (small tree, 20 ft. high, in second-growth woods).

Small tree or shrub. Branchlets with rough, grayish bark. Leaves coriaceous, obovate, 2.5–6.5 cm. long, 1.5–3.0 cm. wide, rounded or obtuse at apex, retuse, cuneate at base, granular-punctate on both surfaces, usually reddish below, the margin lightly serrulate, revolute, the midrib canaliculate above, the veins (5–7 pairs) deeply impressed above (as if etched), inconspicuous below, the petiole 4–6 mm. long. Pedicel 2.0–3.5 cm. long, the bracteoles either opposite immediately below calyx-lobes or alternate on pedicel, when opposite deciduous, when alternate persistent, broadly ovate, 2–3 mm. long, glandular-denticulate; calyx-lobes imbricate, subequal, outer lobes suborbicular or broadly ovate, 4–7 mm. long, 5–6 mm. wide, the margin scarious, entire or glandular-denticulate, the inner lobes broad-ovate, 6–8 mm. long, 5–6 mm. wide; petals obtuse or suborbicular at apex, 6–7 mm. long, 5–6 mm. wide, joined only for 1 mm. at base; stamens ca. 50, probably uni-seriate, appearing bi-seriate, 3.5–4.5 mm. long, the filaments 1+ and 2 mm. long, uniformly linear, the anthers ca. 2 mm. long, the connective projected into a blunt apex ca. 0.5 mm. long; ovary umbonate at first, 1 mm. long, ca. 3 mm. diam. at base, 2-celled with ca. 5 ovules in each cell, the style 3 mm. long, the stigma punctiform. Fruit immature, conical.

This species is characterized by thick coriaceous leaves with deeply impressed veins on the upper surface. The two specimens collected by Matuda are characterized also by a reddish color on the lower surface of the leaf, especially on the midrib. However, in the Skutch specimen, the midrib is more nearly yellow. In the type, *Matuda* 2814, the outer calyx-lobes are distinctly glandular-denticulate, yet in *Matuda* 4077 and *Skutch* 993 the outer lobes are scarious and entire. In *Skutch* 993 and the type, *Matuda* 2814, both fruiting specimens, the bracteoles are opposite and immediately below the calyx, while in *Matuda* 4077, a flowering specimen, the bracteoles are alternate and situated on the pedicel. However, despite all this variation, there is no question concerning the status of the species and the relationship of the specimens cited above.

7. ***Ternstroemia sylvatica*** Schlechtendal & Chamisso in *Linnaea*, **5**: 220. 1831. — Hemsley, *Biol. Centr.-Amer. Bot.* **1**: 92. 1879. — Conzatti, *Gen. Veg. Mexico*, 111. 1903. — Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Mokofua sylvatica (Schlechtendal & Chamisso) O. Kuntze, *Rev. Gen. Pl.* **1**: 63. 1891.

Taonabo sylvatica (Schlechtendal & Chamisso) Szyszyłowicz in *Nat. Pflanzenfam.*

III, **6**: 189. 1893. — Rose in *Contrib. U. S. Nat. Herb.* **8**: 323, fig. 14. 1905. —

Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Ternstroemia occidentalis Sessé & Mocino, *Fl. Mex.* ed. 2, 128. 1894. Non Choisy 1855.

?*Ternstroemia cuneifolia* Sessé & Mocino, *Fl. Mex.* ed. 2, 128. 1894. Non Gardner 1845.

DISTRIBUTION: Mexico (Vera Cruz, Mexico, Guerrero, Hidalgo).

MEXICO: Vera Cruz: "In sylvaticis inter Jalapan et San Andres, Aug. atque prope San Miguel del Soldado," *Schiede & Deppe* 455 (ISOTYPE of *T. sylvatica*, G, Mo; photo & fragment, FM). — San Miguel del Soldado, alt. 1800 m., *C. G. Pringle* 8169 (AA, G, Mich, Mo, NY, US), April 20, 1899 (10–15 ft. high). — Zacuapan and vicinity, *C. A. Purpus* 2290 (FM, G, Mo, NY, US), Oct. 1906 (small tree). — Forests near Tecomatla and Tolutla, *C. A. Purpus* 10118 (G, NY, US), 10846 (FM, Mo, NY, US). — Sierra Chicomguico, *C. A. Purpus* 6226 (FM, G, Mo, NY, US), Aug. 1916. — Vallee de

Cordova, *M. Bourgeau* 2241 (G, US), April 2, 1866. Mexico: Temascaltepec and Toluca, in mountains, *Sessé & Moçino s.n.* (ISOTYPES of *T. occidentalis*, FM). Guerrero: Cliffs along Acapulco Bay, Acapulco, O. M. *Clark* 6903 (NY), June 23, 1935. — Hidalgo: Trinidad, *C. G. Pringle* 13480 (US), April 25, 1904.

Small tree with grayish rugose branchlets. Leaves chartaceous to subcoriaceous, oblong-elliptic to oblanceolate, 5.5–8.0 cm. long, 1.5–2.0 cm. wide, acuminate at apex, tapering at base, granular-punctate on both surfaces, the margin plane, entire, the midrib lightly canaliculate above, fading toward apex, the veins ca. 8 pairs, obscure, the petiole 3–5 mm. long. Pedicel short, usually less than 1 cm., occasionally up to 1.5 cm. long; bracteoles 2, opposite, immediately below calyx-lobes, deltoid-ovate, ca. 2 mm. long, 2.0–2.5 mm. wide at base, sparingly glandular-denticulate; calyx-lobes imbricate, subequal, rounded, the outer lobes ca. 5 mm. long and 4.5 mm. wide, very sparingly glandular-denticulate, often appearing entire, the inner lobes ca. 5 mm. long and 5 mm. wide; petals suborbicular, 6.0–6.5 mm. long and ca. 5 mm. wide, joined 1.5–2.0 mm. at base; stamens ca. 60, bi-seriate, 4–5 mm. long, the filaments linear, ca. 2.5 mm. long, joined at the base and adnate to the base of the corolla, the anthers linear, 1.5–2.0 mm. long, the connective projected into a short appendage 0.25 mm. long; ovary ovate at first, developing conically, 2 mm. long and ca. 2 mm. diam. at base, 2-celled, each cell with ca. 5 ovules, the style 5–6 mm. long, the stigma punctiform. Fruit conical to ovate, ca. 1.7 cm. long and 1.5 cm. diam.

The elliptic, acuminate, chartaceous leaves, seldom over 2 cm. wide, are the outstanding characters of this species. The pedicels are short, seldom over 1 cm. wide, usually less. Closely related, if not identical, is the dubious species *T. lineata* DeCandolle. This latter name is discussed later in this treatment under the heading "Dubious Species."

8. ***Ternstroemia megaloptycha*, sp. nov.**

Arbor parva, 6–12 metralis, ramulis teretibus griseis vel brunneo-griseis. Folia crasso-coriacea, obovata, 7–12 cm. longa et 3.0–4.5 cm. lata, apice obtusa vel rotundata, basi cuneata vel attenuata, margine integerrima, plana vel laeve subrevoluta, costa supra canaliculata, venis undique inconspicuis, petiolis 1.0–1.5 cm. longis. Pedicelli crassi, 2.0–2.5 cm. longi, bracteolis 2 inaequalibus, majore orbiculare 5–6 mm. longo et 4–5 mm. lato, margine glanduloso-denticulato, minore ovato vel deltoideo, 2.5–3.0 mm. longo et lato, margine glanduloso-denticulato; sepala 5, imbricata, granda, rotundata, sublignosa, exterioribus 10–11 mm. longis et ca. 11 mm. latis, margine glanduloso-denticulatis non scariosis, interioribus 11–12 mm. longis et latis, apice apiculatis, margine scariosis integerrimis; petala 5, pallide luteo-albida, 11–12 mm. longa et 7–10 mm. lata, basi ad 4 mm. connata; stamina ca. 70, bi-seriata, crassa, 7–9 mm. longa, filamentis 2–3 mm. longis, basi connatis et ad corollam adnatis, antheris 4.5–5.0 mm. longis, connectivo in apiculum 1+ mm. longum projecto; ovarium umbonatum vel subconicum, 2.5 mm. longum et basi 5 mm. diam., 2-loculatum, loculis 7–8-ovulatis, stylo 4.5–5.0 mm. longo, stigmatibus punctiformi. Fructus immaturus conicus, ca. 1.5 cm. longus et basi 1.2 cm. diam.

DISTRIBUTION: Honduras.

HONDURAS: Dept. Comayagua: San Luis, cut-over valley lands, alt. 750 m., *J. B. Edwards* 594 (AA, TYPE; FM, US), May 2, 1933 (tree 35 ft. high with ivory-

colored flowers). — San Luis, Rancho Grande, open mountain forest, alt. 1200 m., *J. B. Edwards* 220 (AA, FM), May 18, 1932 (tree 45 ft. high). — Malcotal, Minas de Ora, open mountain forest, alt. 1260 m., *J. B. Edwards* 201 (AA, FM), May 9, 1932 (tree 40 ft. high). — Near El Achote, above the plains of Siguatepeque, in forest at head of ravine, alt. 1350 m., *T. G. Yuncker, R. F. Dawson & H. R. Youse* 6372 (FM, G, Mich, Mo, NY, US), Aug. 7, 1936 (tree about 20 ft. tall, 6 in. diameter). — River bank, plains in vicinity of Siguatepeque, alt. 1050 m., *T. G. Yuncker, R. F. Dawson & H. R. Youse* 5592 (FM, G, Mich, Mo), July 2, 1936 (tree ca. 20 ft. tall, 6–8 in. diameter, leaves leathery, dark green and shining above, lighter beneath). — Vicinity of Siguatepeque, moist thickets and along stream in pine forest, alt. 1080–1400 m., *P. C. Standley* 55935 (AA, FM, US), 56187 (AA, FM, US), Feb. 14–27, 1928 (tree 20 ft.). — Dept. Santa Barbara: San Pedro Sula, alt. 1200 m., *C. Thieme* 5141 (FM, NY, US), May 1888.

This species is characterized by the largest flowering parts to be found in the Central American species. The bracteoles measure up to 5–6 mm. long and 4–5 mm. wide, as large as or larger than the calyx-lobes in most other species. The calyx-lobes and petals are over a centimeter long and generally nearly as wide. The stamens are thick and in some instances nearly as long as the petals, far exceeding those in other species in this region. Unfortunately the fruit is immature, but shows evidence of becoming rather large. The species seems to be confined to the Depts. of Comayagua and Santa Barbara in Honduras.

9. ***Ternstroemia Tepezapote*** Schlechtendal & Chamisso in *Linnaea*, **6**: 420. 1831. — Walpers, *Repert. Bot. Syst.* **1**: 369. 1842. — Choisy in *Mém. Soc. Phys. Hist. Nat. Genève*, **14**: 108 (*Mém. Ternstr.* 20). 1855. — Urbina, *Cat. Pl. Mex.* 19. 1877. — Conzatti, *Gen. Veg. Mex.* 111. 1903. — Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Mokofua tepezapote (Schlechtendal & Chamisso) O. Kuntze, *Rev. Gen. Pl.* **1**: 63. 1891.

Taonabo tepezapote (Schlechtendal & Chamisso) Szyszylowicz in *Nat. Pflanzenfam.* III. **6**: 189. 1893. — Rose in *Contrib. U. S. Nat. Herb.* **8**: 323. 1905. — Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Ternstroemia Seleriana Loesener in *Bull. Herb. Bois. sér. 2*, **3**: 213. 1903. — Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Taonabo oocarpa Rose in *Contrib. U. S. Nat. Herb.* **8**: 322. 1905. — Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Taonabo sphaerocarpa Rose in *Contrib. U. S. Nat. Herb.* **8**: 322. 1905. — Standley in *Contrib. U. S. Nat. Herb.* **23**: 822. 1923.

Ternstroemia Hemsleyi Hochreutiner in *Ann. Conserv. Jard. Bot. Genève*, **20**: 193. 1917. — Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Ternstroemia Hemslevi Hochreutiner var. *dentobracteata* Hochreutiner in *Ann. Conserv. Jard. Bot. Genève*, **20**: 194. 1917.

Ternstroemia oocarpa (Rose) Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

Ternstroemia sphaerocarpa (Rose) Melchior in *Nat. Pflanzenfam.* ed. 2, **21**: 142. 1925.

DISTRIBUTION: Mexico, Guatemala, British Honduras, Honduras, Nicaragua, El Salvador.

MEXICO: Vera Cruz: Tecolutla, *Schiede s.n.* (TYPE, Berlin; photo, FM, G). — Misantla, *C. A. Purpus* 5958 (FM, G, Mo, NY, US), July 1912. Tabasco: Achotal, Balancan, *E. Matuda* 3104 (FM, Mich, NY), May 1939 (tree 7–9 m.). Chiapas: Mt. Ovando, *E. Matuda* S-193 (AA, Mich, Mo, NY), 641 (Mich, Mo, US), 656 (Mich, US), Apr. 1936, 1937. — Mountains near Tonalá, alt. 600–1000 m., *E. W. Nelson* 2904 (NY), 2994 (US, type of *T. oocarpa*), Aug. 1895. — Fenia, mountain slopes, *C. A. Purpus* 10015, 10153 (US), Apr. 1925. — Canjob, *E. A. Goldman* 785

(US), 789 (US), March 24, 1904. — Precise locality lacking, *Ghiesbreght* 501 (FM, G, Mo). Oaxaca: Valley of Cuicatlan, alt. 2300–2400 m., *E. W. Nelson* 1902 (US, type of *T. sphaerocarpa*; G, NY), Nov. 1894. — Cumbre de Talca, alt. 1800 m., *B. P. Reko* 4045 (US), Feb. 20, 1919. — Sierra San Pedro Nolasco, Talca, etc., *C. Jurgensen* 567 (type of *T. Hemslevi*, photo and fragm. FM), 1843–1844. — Rincón Antonio, *C. R. Orcutt* 3225 (FM, G, US), Apr. 21, 1910.

GUATEMALA: Dept. Santa Rosa: Santa Rosa, alt. 1000 m., *Heyde & Lux* 2967 (G, US), 2969 (G, US), May 1892. — Zamorora, alt. 1675 m., *Heyde & Lux* 2968 (G, Mo, NY, US), May 1892. Dept. Alta Verapaz: Secanquim, alt. 250–600 m., *O. F. Cook & C. B. Doyle* 64 (US), Apr. 1904. — Secanquim, forest along Saklak River, alt. 200 m., *H. Pittier* 227 (NY, US), May 1905. Dept. Huehuetenango: Chacula, in gorge, alt. 1600 m., *E. Seler* 3099 (G, NY, US, isotypes of *T. Seleriana*), June 27, 1896 (shrub). Dept. Peten: La Libertad and vicinity, *M. Aguilar* 30 (AA, FM, Mich, Mo, NY), Aug.–Nov. 1933. — La Libertad, *C. L. Lundell* 2578 (FM, Mich, US), 3046 (AA, FM, Mich), 3541 (FM, Mich), 4883 (Mich), Apr.–July, 1933. — Monte Polol, *C. L. Lundell* 3026 (FM), 3036 (Mich), Apr. 1933. — Lake Peten, *C. L. Lundell* 3204 (FM, Mich), May 1933. — Near Chiché, *C. L. Lundell* 1653 (Mich), May 1932 (large tree of savannah island flora). — Vaxactum to San Clemente, *H. H. Bartlett* 12802 (AA, FM, Mich, NY), Apr. 1931. Dept. Izabal: Vicinity of Quirigua, on pine ridge, alt. 75–225 m., *P. C. Standley* 24505 (AA, FM, G, Mo, NY, US), May 1922 (tree 25–40 ft. with dense irregular crown; flowers yellowish white). — Quebradas, open shrubby hillside, *S. F. Blake* 7549 (G, US), May 1919 (tree 15 m.; flowers pinkish white with yellow-tipped anthers). — Between Mella and Izabal on Montana de Mico, alt. 65–600 m., *J. A. Steyermark* 38530 (FM), Apr. 1940 (tree).

EL SALVADOR: *S. Calderon* 1497 (G, Mo, NY, US), Dec. 1922 (large tree; vernacular name "*trompillo*"). — *S. Calderon* 2319 (G, NY, US).

BRITISH HONDURAS: El Cayo, *H. H. Bartlett* 13013 (AA, FM, Mich, NY, US), May 1931. — Middlesex, dense forest, alt. 60 m., *W. A. Schipp* 344 (AA, FM, G, Mich, Mo, NY), Sept. 1929 (rare tree, 30 ft. high). — All Pines, secondary forest, *W. A. Schipp* 556 (AA, FM, G, Mich, Mo, NY), July 1930 (tree 20 ft.). — Little Cocquericot, Belize River, Big Fall Pine Ridge, *C. L. Lundell* 4320 (FM, Mich), Apr. 1933. — El Cayo Distr., Mt. Pine Ridge, San Agustin, in sandy pine-oak uplands, *C. L. Lundell* 6838 (G, Mich, NY, US), July–Aug. 1936 (tree 17 m.). — El Cayo Distr., Vaca, on river bank, *P. H. Gentle* 2480 (FM, Mich), Apr. 1938. — Between Mullins River and Manatee, in pinelands, *P. H. Gentle* 3384 (AA, Mich, NY), Aug. 1940 (fruit yellow). — Toledo Distr., Monkey River, Swasey Branch, in hummock in pine ridge, *P. H. Gentle* 3838 (AA), Dec. 1941. — Maskall, *P. H. Gentle* 1270 (AA, FM, G, Mich, Mo, NY), July 1934.

Branchlets terete, gray, verticillate. Leaves coriaceous, oblong-obovate or obovate, 7–13 cm. long, 3–4 cm. wide, obtuse or rounded at apex, frequently bluntly acuminate, attenuate at base, the margin entire or slightly crenulate, subrevolute, the midrib canaliculate above, the veins inconspicuous on both surfaces, the petiole 0.7–1.0 cm. long. Pedicels 1.5–2.5 cm. long; bracteoles 2, unequal, opposite, broadly ovate and suborbicular, 2–3 mm. long, 3 mm. wide, glandular-denticulate along the margin; calyxlobes imbricate, unequal, the outer lobes suborbicular, ca. 8 mm. long and wide, the margin glandular-denticulate, the inner lobes broadly ovate or subelliptic, ca. 9 mm. long and 6 mm. wide, apiculate, the margin scarious, entire; petals lanceolate to ovate, ca. 8 mm. long and 4 mm. wide, acute at apex, joined nearly one-half their length; stamens ca. 50, bi-seriate, 4.5–5.5 mm. long, the filaments 1.0–1.5 mm. long, somewhat thickened, joined at base and adnate to base of corolla, the anthers 2.5–3.0 mm. long, the connective projected into an apicule ca. 1 mm. long; ovary flattened or um-

bonate, 1.5–2.0 mm. long, 3 mm. diam., 2-celled, each cell 4–5-ovulate, the style 6–7 mm. long, the stigma punctiform. Fruit conical or subconical, 1–2 cm. long, 1.0–1.5 cm. diam.

The type of this species was collected by Schiede at Tecolutla, Vera Cruz, and is deposited in the herbarium at Berlin. Photographs may be found at the Gray Herbarium and the Field Museum. The actual type is very fragmentary, consisting of a very few leaves and two fragmentary flowers past anthesis. Very little information concerning this species could be gleaned from an examination of this specimen, as Loesener attested in describing *T. Seleriana*.

Only one specimen, *C. A. Purpus* 5958, is found in American herbaria collected in Vera Cruz. To my mind, this is not typical *T. Tepezapote*, although, as in the type, the leaves are slightly crenulate along the margin. On the Purpus specimen, the outer calyx-lobes are only 4 mm. long and less than one-half the length of the inner lobes (8–9 mm.). The young immature fruit capsule is oblong-conical, ca. 1 cm. long and 0.5 cm. diameter. The type shows outer calyx-lobes smaller than the inner lobes but not to such a marked degree as is found in *Purpus* 5958.

The above specific description was drawn from *Matuda* S-193. To my mind this specimen is the most typical representative of *T. Tepezapote* examined. However, as far as that goes, any worker might select any specimen as typical and be justified in his selection. Several species, *T. Seleriana* Loesener, *T. oocarpa* Rose, *T. sphaerocarpa* Rose and *T. Hemsleyi* Hochreutiner have been placed under *T. Tepezapote* as synonyms. This action was taken only after several periods of study. Although there are minor variations, they are all too close for specific delimitation. I have considered them under the headings of varieties and forms and could not find any clear lines of separation based on any characters. They vary most in bracteole structure. As stated in an early paragraph, the bracteoles are always unequal in size and vary in shape as well, on a single flower. Both rounded and deltoid bracteoles may subtend the calyx-lobes on a single flower. Hence, we have variations from the minute deltoid (*Purpus* 5958, 1×1 mm.) through the ovate-triangular (*Ghiesbreght* 501, 2 mm. long) and the subrotund and ovate-deltoid (*Lundell* 1653, 3×3 mm.) to the broadly ovate and orbicular (*Nelson* 1902, 4.5×3.0 mm.). Combinations of these typical variations may be found on a single pedicel. The bracteoles of *T. oocarpa* are described as deciduous. In the type, this condition holds quite true. When present (a few were found) they are broadly ovate-elliptic, ca. 3.0 mm. long and 2.5 mm. wide. This character of deciduous bracteoles is not consistent. The fruit of *T. oocarpa* is markedly conical, but so are the fruits of all material cited above, to one degree or another.

To set up a series of varieties based on the bracteole character is not at all satisfactory, as I have discovered. From the Peten and Alta Vera Paz regions of Guatemala comes a series of specimens with large bracteoles, ca. 4 mm. long and 3 mm. wide, varying from subrotund to deltoid-ovate. This same type of bracteole is found on *Nelson* 1902, (Oaxaca), the type

of *T. sphaerocarpa*. On the type of *T. Hemsleyi*, the bracteoles are ca. 3 mm. long and wide but are ovate-triangular. In the latter specimen, the calyx-lobes are only sparsely glandular-denticulate, appearing entire.

From the El Cayo district of British Honduras a series of specimens has been collected with small minute deltoid bracteoles. However, in Vera Cruz and Oaxaca, specimens with similar small bracteoles are found. One might here suggest two varieties or at least forms. However, connecting the two is a series of variations making it impossible to draw a dividing line even on a geographical basis.

DUBIOUS SPECIES

Ternstroemia lineata DeCandolle in Mém. Soc. Phys. Hist. Nat. Genève, **1**: 409, t. 1 (Mém. Ternstr. 17, t. 1), 1822; Prodr. **1**: 523, 1824.—Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 105 (Mém. Ternstr. 17), 1855.—Melchior in Nat. Pflanzenfam. ed. 2, **21**: 142, 1925.

Taonabo lineata (DeCandolle) Rose in Contrib. U. S. Nat. Herb. **8**: 322, 1905.

DeCandolle, in the original description of this species, states: "Corolla subglobosa albida cum linea rubra transversali in medio loborum picta" and "Bracteolae nullae aut deciduae." The above quotations would indicate that the description was drawn from a plate of Moçño in the possession of DeCandolle or from a copy of the original. An actual type may be non-existent! I doubt the presence of a transverse red line on the corolla of any species of *Ternstroemia*! Possibly a mark or line across the petals caused by pressure against the stamens may be indicated. However, the illustration shows this marking on both surfaces of the corolla. Furthermore, DeCandolle, had he possessed an actual specimen, should have been able to distinguish definitely whether the bracteoles were "nullae aut deciduae." The bracteole scars, undoubtedly, were present, even though the actual bracteoles were not.

These two characters (corolla markings and bracteoles) are the only differences I can mark between *T. lineata* and *T. sylvatica*, and these two characters are as dubious as the species itself. However, I am unwilling to use the name *T. lineata* in place of the well established and well described *T. sylvatica*, one of the best known species in Mexico, unless the actual type can be found in the Madrid Herbarium.

EXCLUDED SPECIES

Ternstroemia Purpusii T. S. Brandegee in Univ. Calif. Publ. Bot. **6**: 187, 1915 = ***Symplococarpon Purpusii*** (Brandegee) Kobuski in Jour. Arnold Arb. **22**: 191, 1941.

Ternstroemia serrulata Pavon ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 110 (Mém. Ternstr. 22), 1855 = ***Cleyera serrulata*** Choisy, loc. cit.

Ternstroemia siphilitica Pavon ex Choisy in Mém. Soc. Phys. Hist. Nat. Genève, **14**: 110 (Mém. Ternstr. 22), 1855 = ***Cleyera integrifolia*** (Benth.) Choisy, loc. cit.

STUDIES OF THE ICACINACEAE, III A REVISION OF EMMOTUM

RICHARD A. HOWARD

With four plates

THE genus *Emmotum* is the largest genus of the New World Icacinaceae. It now includes twelve species and is limited to northern South America, being centered in the Amazon basin. Few of the species are widespread and several are known only from a single mountain.

The genus is easily recognized and is quite distinct among the Icacinaceae. Van Tieghem was so impressed by its characters that he established it as the sole genus of a separate family, the Emmotaceae, allied to the Icacinaceae. The characters upon which he recommended this separation are pronounced; however, such family characters of the Icacinaceae as articulated flowers, valvate aestivation of the corolla, alternate stamens, and two pendent anatropous ovules, of which but one matures, are shared with his segregated unit and it seems preferable to retain it within the Icacinaceae.

Hamilton described *Emmotum* in 1825, crediting it to Desvaux. Miers was the first to recognize that *Pogopetalum*, which Benthham described in 1841, was identical with *Emmotum*. Engler, in 1872, proposed a division of the genus into two sections, which he called *Longistyla* and *Brevistyla*. These groups were based on differences in the petals, stamens, and pistils. Sleumer has accepted this same division, but he established subgenera and substituted the names *Euemmotum* and *Pogopetalum* for Engler's sections. The second section originally contained *E. nitens* (the type selected by Sleumer) and *E. glabrum*. Unfortunately, the latter species does not have the characters of the section and cannot belong there. This error may be traced to an inaccurate plate of Miers. These illustrations are confused and apparently there was an interchange of parts of the two species represented. Isotypes of the species and examination of the original descriptions show this clearly. By removing *E. glabrum* from the subgenus *Pogopetalum* (i.e. the section *Brevistyla* Engler), only *E. nitens* remains. Since the usefulness of this monotypic subgenus is doubtful, it seems advisable to abandon it. The genus *Emmotum* is, accordingly, undivided in this paper.

When van Tieghem proposed the Emmotaceae as a segregated family, he also separated *E. nitens* as a distinct genus, *Pogopetalum*. The characters justifying this newly proposed genus were those previously used by Engler as characters of his section *Brevistyla*. I am treating *Pogopetalum* van Tieghem as a synonym of *Emmotum*.

I am grateful to the directors and curators of the following herbaria for the use of the materials examined in this study: Arnold Arboretum (A), University of California (C), Field Museum of Natural History (FM),

Gray Herbarium (G), New York Botanical Garden (NY), United States National Herbarium (US).

EMMOTUM Desvaux ex Hamilton

Emmotum Desv. ex Hamilton, Prod. Fl. Ind. Occ. 29. 1825; Miers, Ann. Mag. Nat. Hist. II. **9**: 223. 1852, II. **10**: 176. 1852, III. **4**: 366. 1859, Contrib. Bot. **1**: 107. 1851-61; Benth. & Hook. Gen. Pl. **1**: 352. 1862; Baillon, Adansonia **3**: 93. 1863; Engler in Mart. Fl. Bras. **12**(2): 43. 1872; Valetton, Crit. Overz. Olac. 203. 1886; Engler, Nat. Pflanzenfam. **3**(5): 251. 1893; van Tieghem, Bull. Soc. Bot. France **44**: 119. 1897; Sleumer, Notizbl. **15**: 233. 1940.

Emmotum Sect. *Longistyla* Engler in Mart. Fl. Bras. **12**(2): 44. 1872.

Emmotum Sect. *Brevistyla* Engler, l.c.

Emmotum Subg. *Euemmotum* Sleumer, Notizbl. **15**: 233. 1940

Emmotum Subg. *Pogopetalum* Sleumer, l.c.

Pogopetalum Benth. Trans. Linn. Soc. **18**: 680. 1841, Ann. Mag. Nat. Hist. **7**: 216. 1841.

Flowers perfect, 5-parted; calyx campanulate, fleshy, lobed, persistent; petals valvate, free, fleshy, hirsute, rarely glabrate outside, inside lanate on the raised midrib, the inflexed apex minute, glabrous; stamens free, alternate; anthers ovate-oblong, the thecae two, longitudinally dehiscent extrorsely along the junction with the connective, the connective fleshy, bilobed or cordate at the base, the filament attached basally to the connective or dorsally near the base, glabrous, fleshy, broad and flattened; pistil superior, the ovary globose or dorso-ventrally compressed, glabrous or densely hirsute, frequently with a differentiated fleshy sterile ring of tissue at the base, 2- or 3-loculed; ovules two to each locule, pendent from the apex, anatropous, almost collateral; style terminal or slightly eccentric, glabrous, the apex rounded or slightly 3-lobed; drupe with a thick putamen and one or rarely three fertile cells, one seed to each cell, curved, albuminous, the cotyledons orbicular, the radicle elongate.

Trees, rarely shrubs, the branches pubescent; leaves alternate, petiolate, exstipulate, simple, entire, coriaceous, pinnately and arcuately veined; inflorescence axillary, fascicled, paniculate, bracteate, the flowers articulated.

TYPE SPECIES: *Emmotum fagifolium* Desv. ex Hamilton.

DISTRIBUTION: Brazil, French and British Guiana, Peru, and Venezuela.

The species of *Emmotum* have been reported either as shrubs or as trees up to 45 feet in height and with trunk diameters of 8-12 inches. They grow in a variety of habitats, from sandy coastal plains to high mountains, but are predominately trees of undisturbed forests which are not flooded. Several species have been reported at 5000 feet altitude. The mature wood is available for study from only one species and the anatomy of the stem has been considered in another series of papers (Bailey and Howard, Jour. Arnold Arb. **22**: 129, 171-187, 432-442, 556-568. 1941).

The thick coriaceous leaves have the midrib and veins sulcate above and usually prominent below. The veins are either straight and parallel for most of their length, or are arcuate for their full length. The ends of the veins approach the margin of the leaf and remain free. Only in *E. conjunctum* do the tips anastomose noticeably. The texture of the leaf is thick and firm and the veinlets are obscure. Between the veins are minute trans-

verse ridges caused by the underlying fibers. Van Tieghem mentions these peculiar and quite numerous characteristic fibers, which surround the meristeles and the veinlets. Their walls are spirally thickened and the fibers add noticeably to the strength and consistency of the lamina.

The leaf-blade is usually densely pilose or tomentose on both surfaces when young and becomes glabrate and shining above. The pubescence on the lower leaf-surface may persist or may be lost very early. These thick-walled hairs are articulated to relatively large thin-walled bases. The bases are lighter in color than the rest of the epidermal cells and are quite noticeable in the older leaves. These are the structures to which, I believe, Miers applies the term glands. The pubescence in *Emmotum* frequently is a rich golden or brown color. In some instances the pubescence will lose its color and become silvery or gray as the leaf matures. In other species, however, there is no indication of this color change and the older leaves have a pubescence of the same color as the younger ones. A similar pubescence may be found on the young branches, the inflorescence, and the outside of the perianth. In many species the leaf-blade has, in addition to a colored pubescence, pigmentation in the cells. This pigmentation may also pervade the tissues of the bark and wood, the calyx and corolla, the filament and connective, and frequently the tissues of the ovary and the fruit. It appears to be similar to that also found in *Poraqueiba* and *Ottoschulzia*. It is removed by boiling in water and comes out very rapidly in hot caustic soda. Not all of the cells of the tissues contain this pigment, but some cells are very full of it.

The axillary inflorescences found in *Emmotum* are composed of 3–8 panicles. They are usually shorter than the petioles and are few-flowered. Axillary inflorescences are also found in many other New World genera, but in none are they so compact, clustered, pubescent, and bracteate. The pedicels are short and bear several ovate bracts. Usually one of these is at the apex of the pedicel and subtends the articulation of the flower. As many authors have noted, the open flowers bear a striking resemblance to *Ximenia* of the Olacaceae.

The calyx is fleshy, with the lobes usually well developed. It enlarges only slightly, if at all, in fruit. The corolla is typical of the family, having hypogynous free petals with a minute inflexed apex. The midrib of the petal is fleshy and well developed into a ridge, which bears a dense red-brown wool usually covering at least the upper two-thirds of the midrib. The one exception to this is found in *E. nitens*, which has the fleshy midrib but has only two clusters of hairs, one near the base and the other at the apex. In all cases the remainder of the inner face of the petal is glabrous, as the pubescence is limited to the midrib. Miers reports that the pubescence bears small glands. I have found none. The hairs when dry are rugose or warty and may even appear as a string of beads, and frequently these irregularities disappear upon swelling in caustic soda. Various collectors report the petals as white, cream, or tawny in color. They are reflexed at maturity and fall very early.

The stamens are extrorse, a condition rarely found in the family. Bentham

reported an introrse dehiscence for *Pogopetalum*; however, he illustrates an extrorse dehiscence in his accompanying plate. The thecae of the anthers are reduced to two. Van Tieghem compares them with the interior pair of a normal tetrathecal anther. The dehiscence is longitudinal, however, and takes place along the junction with the connective. Similar dehiscence is found in *Poraqueiba* and *Oecopetalum*. The attachment of the anther with the filament is either basal or dorsal. In some specimens the filament may arch abaxially to the anther; however, this is not conspicuous. The filament is fleshy and flattened. It is frequently reported as fused with the petals, but, at best, this fusion is only weak. The filament curves outward at anthesis.

Usually the ovary in this genus has three locules; however, this number may be reduced to a single one. *Emmotum glabrum* consistently has only two locules. In the family the plural locular condition is not limited to *Emmotum*. It is relatively common in *Citronella* and it has been reported in *Pennantia*. The three locules are eccentrically placed, thereby giving the impression that they represent the remainder of a former 5-loculed ovary. Each locule has two anatropous ovules which are pendent from the apex of the cavity. They are not exactly superposed nor are they collateral, usually having some intermediate position. Only one ovule matures. The style is either terminal or eccentric. When it is terminal the vascular traces are in the axis of the three locules, that is, eccentric. However, the more common condition is a strongly eccentric style. Previous workers have referred to a disk in the flowers of this genus. This term they applied to the ovary-wall, which is fleshy, glabrous or pubescent, and slightly swollen. A section cut through this region shows that the tissue of this sterile area is lighter in color in that it lacks the pigmented cells present elsewhere. In no sense does this tissue seem to be an expansion of the torus or the receptacle. It is not free from the ovary, and both this area and the upper portion of the ovary are covered with a thick epidermis which bears the indument. It seems to be a misapplication of the term to call this area a disk, and it might better be considered simply a differentiated basal sterile ring of ovarian tissue.

The mature drupe may have one to several cells. I have not seen any specimens which have developed seeds. Other workers, however, have reported from one to three locules in the mature fruit with one seed in each. The seed is reported as curved, albuminous as in the rest of the family, with a curved embryo, an elongated radicle, and orbicular cotyledons. The putamen of these fruits is relatively thicker than that of any other New World genus. The outer surface is sharply but irregularly ornamented or dissected, while the inner surface of the locule is smooth.

The relationships of this genus appear to be with *Poraqueiba*, *Oecopetalum*, and possibly with *Ottoschulzia*.

KEY TO THE SPECIES

Style shorter than the ovary or scarcely equalling it; anther-sacs folded inward, the anther basally attached to the filament.

Petals with two distinct clusters of hairs on the midrib; anther as long as or longer than the filament, the connective extended beyond the incurved thecae; style noticeably eccentric; leaves pubescent below at maturity, the lateral veins evident.

Leaves ovate-orbicular.....1. *E. nitens*.

Leaves lanceolate.....1a. *E. nitens* var. *angustifolium*.

Petals with a continuous lanate pubescence on the midrib; anther shorter than the filament, the connective not exceeding the incurved thecae; style essentially terminal; leaves glabrous at maturity, the lateral veins obsolete..2. *E. argenteum*.

Style at least twice the length of the ovary; anther-sacs usually flat.

Ovary glabrous.

Leaves orbicular, the apex rounded, with a short cusp.....3. *E. nudum*.

Leaves ovate, the apex acuminate.

Mature leaves glabrous below, the lateral veins 6 or 7 pairs; petioles short, 1–1.4 cm. long; petals 3.5–4.0 mm. long; stamens 3–3.5 mm. long, the anthers ovate.....4. *E. acuminatum*.

Mature leaves densely tawny pubescent below, the lateral veins 10 or 11 pairs; petioles 1.5–2.0 cm. long; petals 6–6.5 mm. long; stamens 5.5 mm. long, the anthers ovate-oblong.....5. *E. floribundum*.

Ovary hirsute.

Exterior of perianth almost glabrous; ovary two-celled; sepals pubescent only at the tips; petals sparsely pubescent outside on a median line; anther-sacs folded inward, the anther attached basally to the filament; leaves glabrous at maturity.....6. *E. glabrum*.

Exterior of perianth densely pubescent; ovary three-celled; sepals and petals evenly pubescent outside; anther-sacs flat, the anther attached dorsally above the base; leaves pubescent or becoming glabrate.

Leaves ovate to orbicular.

Leaves orbicular, the apex obtuse, the lateral veins 6 pairs...7. *E. orbiculatum*.

Leaves ovate, the apex acute or acuminate.

Leaves densely fulvo-sericeous below, the veins 11 pairs, the lamina 10–22 cm. long, 8–13 cm. broad.....8. *E. holosericeum*.

Leaves short and conspicuously hirsute below, smaller, the lateral veins 6–8 pairs, the lamina 8–12 cm. long, 4–7 cm. broad.....9. *E. affine*.

Leaves oblong or elliptic.

Veins obsolete.....2. *E. argenteum*.

Veins prominent.

Lateral veins 12 or 13 pairs, pinnate, parallel, conspicuously anastomosing at the margins, the lamina bicolorous.....10. *E. conjunctum*.

Lateral veins 7–9 pairs, arcuate, free at the margin, the lamina concolorous.

Pistil with a differentiated sterile glabrous area conspicuously developed at the base; plant silky-white-short-pilose or sericeous; petioles slender.....11. *E. fagifolium*.

Pistil without the differentiated area conspicuously developed at the base; ovary pubescent almost to the base; plant densely golden-brown-hirsute; petioles stout.....12. *E. fulvum*.

1. *Enmotum nitens* (Benth.) Miers, Ann. Mag. Nat. Hist. II. 10: 180. 1852.

Pogopetalum nitens Benth. in Hook. Lond. Jour. Bot. 2: 377. 1843.

Siagonanthus sericeus Pohl ex Engler in Mart. Fl. Bras. 12(2): 46, as synonym. 1872.

Tree, the branches striate, angular, densely short-gray-pubescent; petioles 1–2 cm. long, deeply but narrowly sulcate above, densely gray-pubescent; lamina oblong, 7–14 cm. long, 4–8 cm. broad, coriaceous, glabrous, shining above, densely gray- or brown-short-pilose or sericeous below, the apex acuminate or acute, the base rounded, the margin slightly revolute, the midrib sulcate above, prominent below, the lateral veins 6 or 7 pairs,

inconspicuous above, arcuate, free at the ends; panicles 3 or 4, fascicled, 1–1.3 cm. long, densely yellow- or brown-short-pubescent; bracts ovate, acuminate at the apex, densely pubescent; calyx 2 mm. in diameter, fleshy, densely pubescent, the lobes 0.5 mm. high, obtuse, rarely acute; petals lanceolate or broadly lanceolate, 3–4 mm. long, 1–1.3 mm. broad, acute at the apex, densely strigose or hirsute, white- or golden-brown-pubescent outside, inside bearing two large clusters of lanate hairs, one at the base and the other near the apex of the fleshy raised midrib, the rest of the petal glabrous, the inflexed apex short, glabrous or rarely minutely papillate; stamens 2.8–3.2 mm. long, the anthers attached basally, 1.5–1.8 mm. long, the thecae incurved, the connective oblong, fleshy, curved, extending beyond the thecae to an obtuse or rounded apex, the filament shorter than the anthers at anthesis; pistil shorter than the stamens, 1–1.5 mm. high at anthesis; ovary globose, densely short-gray- or golden-brown-pilose, the base differentiated into a fleshy glabrous sterile area, the ovary three-celled; style eccentric, much shorter than the ovary, glabrous, minutely three-lobed at the apex; drupe depressed-globose, 1–1.5 cm. in diameter, 1–1.2 cm. high, sparingly pilose, becoming glabrate, the putamen extremely thick, rugose or sculptured outside, the three locules each one-seeded.

TYPE COLLECTION: *Gardner 3309*, from Pernambuco, Brazil.

ILLUSTRATIONS: Miers, *Contrib. Bot.* **1**: *t.* 22. 1851–61; Mart. *Fl. Bras.* **12**(2): *t.* 9. 1872; Nat. Pflanzenfam. **3**(5): *fig.* 139, *M–O.* 1893.

DISTRIBUTION: Brazil (Pernambuco, Matto Grosso, Minas Geraes, Goyaz, Bahia).

BRAZIL. *Matto Grosso*: Santa Clara de Chapada, *Malme 1470* (G). *Minas Geraes*: Paracatu, *Glaziou s.n.* (NY); Corinto, Corrigo diamante, alt. 590 m., *Mexia 5591* (FM, G, NY, US). *Goyaz*: *Gardner 3309* (FM, G, NY, ISOTYPES); *Burchell 9233* (G). *Bahia*: Serra de Açurua, Rio S. Francisco, *Blanchet 2889* (FM, NY). Without locality: *Herb. Hook. 1105* (G); *Pohl s.n.* (FM), 1935 (G), 1936 (G).

Both Glaziou and Mexia report this plant to be a large tree. The plant in dried condition may have either a golden-brown or a gray to silky-white pubescence on all parts, particularly on the under side of the leaves. The upper leaf-surface is commonly shining and usually is a dark purple when dry. Frequently two bracts are found immediately below the calyx, surmounting the pedicels. The separated clusters of hairs on the inside of the petals are very different from anything else found in the genus. The noticeable incurving of the anther-sacs and the obtuse incurved projecting tip of the connective characterize the anthers of this species. The basal attachment of the anther to the filament is found only in this species and *E. glabrum*. A belt of dark stained cells is commonly present in the middle of the filament. The stamens do not recurve in *E. nitens* at anthesis, as they do in the rest of the species, but remain arched over the pistil. The short style is the initial character of Engler's section *Brevistyla* and has a counterpart only in *E. argenteum*. This species was indicated as the type of van Tieghem's genus *Pogopetalum*.

Miers seems to have made an error in the plates of *E. nitens* in *Contrib. Bot.* **1**: *pl.* 22. The petals as drawn on *E. nitens* probably belong with *E. glabrum*. I have examined isotypes of numbers cited by Miers and find that the specimens do not agree with his plates. Engler in *Nat. Pflanzen-*

fam. has redrawn the petals of *E. nitens* and has correctly shown the separation of the clusters of hairs on the inside of the petals.

Bentham's original description indicates the ovary as glabrous. Examination of cited material shows that this also must have been an error.

1a. ***Emmotum nitens*** (Benth.) Miers, var. ***angustifolium*** Engler in Mart. Fl. Bras. **12**(2): 46. 1872.

Schnizleinia nitida Mart. ex Engler, l.c., as synonym.

Leaves narrow, lanceolate; panicles few-flowered, equal in length to the petiole.

ILLUSTRATION: Mart. Fl. Bras. **12**(2): t. 9. fig. 2. 1872.

I have seen no specimens referable to this variety, but Engler's plate shows well the varietal differences described.

2. ***Emmotum argenteum*** Gleason, Bull. Torrey Bot. Club **58**: 385. 1931.

Small slender shrub, the branches terete, densely sericeous when young, becoming glabrate; petioles short, 5–7 mm. long, densely sericeous, broadly sulcate above; lamina oblong, 7–10 cm. long, 3.5–4.5 cm. broad, coriaceous, red-brown in color, the apex abruptly acuminate to a sharp cusp 10–14 mm. long, the base rounded, the margin flat, the young leaves densely silvery-sericeous on both sides, becoming glabrate except on the midrib above and below, the midrib prominent below, the veins weakly developed or obsolete, the veinlets scarcely visible; inflorescence few-flowered, densely sericeous; bracts ovate; calyx 2 mm. in diameter, 2 mm. high, the lobes ovate, acute, 0.9–1.2 mm. long, 0.8 mm. broad, sericeous outside, inside weakly villose or lanate; stamens 2.0–2.8 mm. long, the anthers ovate, 0.8–0.9 mm. long, separate at the base, the thecae recurved, the connective fleshy, not exceeding the anther-sacs, the filaments attached at the base of the connective, fleshy, broadest near the apex; ovary globose, 1–1.4 mm. in diameter, 2- or rarely 3-celled, densely long-white-hirsute to the base, with no sterile area conspicuously differentiated; style straight, 0.6–0.8 mm. long, terminal, glabrous, 3-toothed at the apex; fruit unknown.

TYPE COLLECTION: Tate 564 (NY), collected in Amazonas, Venezuela, on Mt. Duida.

Emmotum argenteum was collected at an altitude of 4800 feet. It is a distinct species and may be readily recognized through its dense pubescence on the younger parts, the practically obsolete and inconspicuous lateral veins of the subglabrous mature leaves, the fleshy filaments, and the two-celled ovary. The two-celled ovary has a terminal style, and these two conditions are found elsewhere in the genus only in *E. glabrum*, which also has the inconspicuously veined leaves but has a different leaf-shape. The relationship of this species is, more correctly, with *E. glabrum*. I have not seen any evidence of the 3-celled ovary reported in the original description.

3. ***Emmotum nudum*** sp. nov.

Emmotum orbiculatum sensu Engler in Mart. Fl. Bras. **12**(2): 45. 1872; not Miers.

Arbor amazonica; ramulis cinereis; petiolis 9–18 mm. longis crassis profunde sulcatis breviter cinereo-pubescentibus; laminis orbiculatis, 9.5–13 cm. longis, 7–9 cm. latis, supra glabris nitidis nervo medio sulcato notatis, subtus dense sericeo-pilosis nervum medium prominentem et nervos laterales subprominentes 7-arcuatos ad apicem liberos gerentibus, apice rotundatis aut obtusis mucronatis, basi rotundatis; calyce campanulato, 2 mm. dia-

metro, 1.5 mm. alto, sericeo-piloso, lobis triangularibus, 0.5 mm. longis, 0.7 mm. latis, obtusis; petalis ovatis vel lanceolatis, 4.7 mm. longis, 1–1.2 mm. latis, latere interiore carinam rufo-lanatam proferentibus, latere exteriori sericeis; staminibus 3–4 mm. longis, antheris ovato-oblongis 1–1.1 mm. longis, thecis planis; ovario globoso 1 mm. diametro glabro 3-loculato; stylo eccentrico 2 mm. longo glabro; fructu drupaceo globoso, 1.2 cm. longo, 1.0 cm. lato, 0.4 cm. alto.

ILLUSTRATION: Plate 1.

BRAZIL. Pará: Faro, "in campis arenosis loco Tigre," Dec. 31, 1929, *Ducke 11367* (US 1473378, TYPE); campos a l'est de Faro, *Ducke 8707* (US). Amazonas: Rio Negro, above the opening of the Casiquiari, *Spruce 3541* (FM, photo, G, NY).

This plant is distinct in its orbicular leaves and glabrous pistil. The flowers are white and odorous, according to Ducke. The fruit is 3-celled, with apparently only one seed developing in each cell; however, all the seeds are aborted in the fruits I have available for study. The mature fruits are prominently three-lobed. A section through the sclerified putamen shows several cavities present other than the three ovuliferous locules. The locules are oblong in section, eccentric, smooth inside and regular in outline. There are two smaller cavities between these locules and two larger cavities, circular in section, outside of the lateral locules. These four cavities are irregular in shape and very rough on the inner surface. They are empty in all the specimens I have seen. While two of them are larger in section than are the ovuliferous locules, none of them have the vertical extension of the locules. These cavities do not appear to be developed at the flowering stage.

Pogopetalum orbiculatum was described by Bentham and was based on a Schomburgk collection from the Padawire river, Amazonas, Brazil. Bentham definitely notes the hirsute or pilose nature of the pistil. Nevertheless Engler has referred a Spruce collection (3541) with strictly glabrous pistils to this species. I regard the Spruce specimen as specifically distinct and have placed it with *Emmotum nudum*. While the collections cited by Engler appear similar in leaf-form, the strictly glabrous nature of the pistil in *Emmotum nudum* suggests that a different species is represented.

It might be noted here that the specimens collected by Ducke called "*E. orbiculatum*" and later referred to *E. acuminatum* (Arch. Inst. Biol. Veg. Rio 4: 45. 1938) are representatives of the present species.

4. *Emmotum acuminatum* (Benth.) Miers, Ann. Mag. Nat. Hist. II. 10: 178. 1852. Contrib. Bot. 1: 108. 1851–61.

Pogopetalum acuminatum Benth. Trans. Linn. Soc. 18: 685. 1841, Lond. Jour. Bot. 2: 377. 1843.

Medium-sized tree, the branches terete, slightly striate, sparsely puberulent, soon becoming glabrate; petioles 1.3–2.0 cm. long, sulcate above, puberulent when young, becoming glabrate; lamina ovate-oblong to oblong, 8–15 cm. long, 5–8 cm. broad, glabrous, shining above, usually darkening on drying, appressed-hirsute or pilose when young, becoming glabrate except on the veins and midrib, the midrib sulcate above, prominent below, the lateral veins 6 or 7 pairs, arcuate, free at the ends, the veinlets inconspicuous, the apex narrowly long-acuminate to a mucronate point 1–2 cm. long, the base rounded, the margin slightly revolute; inflorescence about equal to

the petiole in length, densely short-sericeous; calyx campanulate, 1.5 mm. in diameter, 1 mm. high, the lobes broadly triangular, 0.2–0.3 mm. high, nearly obtuse, densely short- and finely sericeous; petals oblong-lanceolate, 3.5–4.6 mm. long, 1.1–1.3 mm. broad, lightly sericeous outside, red-lanate inside; stamens 3.1–4 mm. long, the anthers oblong-ovate, 1–1.2 mm. long, the thecae flat, equidistant at both ends, the connective oblong, rounded at the base and apex, attached to the filament dorsally near the base, the filament broadest at the base; pistil glabrous, 3.5 mm. high at anthesis, the ovary globose, 1 mm. in diameter at anthesis, with a conspicuous differentiated area at the base, 3-loculed, the style eccentric, 2.3 mm. long, the apex rounded; drupe 1.5 cm. diameter, depressed-globose.

TYPE COLLECTION: *Schomburgk* 970, collected on the Kukenam River, Amazonas, Brazil.

ILLUSTRATION: Miers, Contrib. Bot. 1: t. 21. 1851–61.

BRAZIL. Amazonas: Kukenam River, *Schomburgk* 970 (FM, G, US, ISOTYPES); Manáos, near Cochaieira, *Ducke* 376 (A, FM, NY, US); Rio Negro, between Barcellos and Sta. Izabel, *Spruce* 1989 (photos FM, G).

The Schomburgk specimens bear labels citing the country of origin as British Guiana. In his Fauna and Flora of British-Guiana, page 1095, Richard Schomburgk reports *Pogopetalum acuminatum* from the banks of the Kukenam, and according to Roth's translation of Schomburgk's Travels in British Guiana 1840–44 (Vol. 2, map facing page 176), this river is one of the headwaters of the Caroni. Careful checking shows that this collection was made in Brazil near the boundaries of Venezuela and British Guiana. Bentham, in his original description of the species, cites the Schomburgk collection as from the banks of the Rio Negro.

Emmotum acuminatum can easily be recognized by its glabrous pistil and ovate long-acuminate leaves. I have not seen the fruits of this species, and my description of the drupe is taken from earlier descriptions. *Emmotum acuminatum* is a tree to 30 feet tall, with pure white flowers.

5. *Emmotum floribundum* sp. nov.

Arbor parva; ramis subteretibus cinereo-pubescentibus mox glabrescentibus; petiolis tenuibus 1.5–2 cm. longis anguste sulcatis cinereo-pubescentibus; laminis ovatis vel oblongis, 9–12 cm. longis, 4.5–5 cm. latis, supra nitidis glabris castaneis, subtus breviter et adpresse castaneo-hirsutis, nervos laterales 10 subprominentes arcuatos ad apicem liberos gerentibus, apice acutis, basi rotundatis; paniculis 3 vel 4 fasciculatis breviter fusco-sericeis; calyce campanulato, 2 mm. diametro, 1.3 mm. alto, sericeo, lobis triangularibus, 0.6 mm. longis, 0.7–0.8 mm. latis; petalis lanceolato-ovatis vel lanceolatis, 6–6.3 mm. longis, 1.5 mm. latis, extus dense cano-sericeis, intus secus costam castaneo- aut rufo-lanatis; staminibus 5.5–6 mm. longis incurvis, antheris ovato-oblongis 1.2 mm. longis, thecis planis, filamentis planis 0.7 mm. latis basim versus dilatatis; ovario globoso glabro 1 mm. diametro 3-loculato; stylo eccentrico 4 mm. longo glabro; fructu ignoto.

ILLUSTRATION: Plate 2.

PERU. Loreto: Mishuyacu, near Iquitos, alt. 100 m., forest, April 1930, *Klug* 1212 (FM, TYPE).

VERNACULAR NAME: *Ingaina*.

Klug reports this to be a tree 40 feet tall, with cream-colored flowers. It is distinct from the other species of *Emmotum* in having a broader inflorescence with large flowers, a glabrous pistil, and ovate leaves with more numerous veins. Only *E. glabrum* has been reported previously from Peru. The present species is closest to *E. acuminatum*.

6. *Emmotum glabrum* Benth. ex Miers, Ann. Mag. Nat. Hist. III. 4: 366. 1859, Contrib. Bot. 1: 230. 1851-61.

Tree, the branches slender, terete, short-cinerosus-pubescent; petioles short, 7-9 mm. long, slender, dorsally canaliculate above with the margins flaring, almost winged, sparsely short-crispose or hirsute-pubescent; lamina ovate to elliptic, 6-9 cm. long, 3.5-4.5 cm. broad, the upper surface glabrous, dull, rarely shining, the lower surface lighter, short-hirsute when young, soon becoming glabrate, ferrugineous when dry, the apex long and narrowly attenuate to a mucronate point 1-1.5 cm. long, the base rounded, the margin flat or slightly revolute, the midrib sulcate above, prominently developed below, the veins almost inconspicuous on both sides, weakly and irregularly arcuate, free at the ends; inflorescence few-flowered, the panicles slender, slightly exceeding the petioles or to 1.5 cm. long, sericeous; calyx campanulate, 2 mm. in diameter, 1 mm. high, the lobes ovate, 0.6-0.7 mm. high, rounded or acute at apex, glabrous but for a ciliated apex or cluster of pilose hairs on the tip; petals ovate-lanceolate, 3.0-3.6 mm. long, 0.7-1.0 mm. broad, glabrous outside but for a median row of short pilose hairs, inside densely red-brown-lanate on the midrib; stamens 3-3.6 mm. long, incurved, the anthers ovate-oblong, 1-1.2 mm. long, the thecae incurved, slightly separate at the base, the filaments broadest at the base; pistil 2.6-3.0 mm. high, the ovary globose, densely silky-hirsute, 1 mm. diameter at anthesis, with a differentiated sterile and pubescent base, 2-loculed; style eccentric, glabrous, 1.4-2.0 mm. long, the apex 3-toothed or rounded; fruit unknown.

TYPE COLLECTION: *Spruce 3536*, collected on the Rio Negro, Amazonas, Brazil.

ILLUSTRATION: Miers, Contrib. Bot. 1: t. 22. 1851-61, as to habit only.

BRAZIL. Amazonas: Rio Negro, *Spruce 3536* (FM, G, NY, ISOTYPES). PERU. San Martín: Chazuta, on Río Huallaga, alt. 200 m., *Klug 3990* (FM, G, NY).

The collection by Klug from Peru is only slightly different from that of Spruce. Klug's collection bears an unpublished herbarium name derived from the country of origin. This Peruvian material differs from the Spruce collection in having the inflorescence shorter than the petioles, the sterile base of the ovary essentially glabrous or with only a few hairs, and the locules abutting on the narrow ends instead of lying parallel for their length. While these differences seem consistent, I do not consider them of sufficient importance to merit specific distinction, even though the two collections were obtained some distance from one another.

I have examined duplicates of the collection cited by Miers and Engler and do not agree with certain details of their descriptions of this species. Neither author indicates the presence of some pubescence on the outside of the corolla. The corolla is sparsely pubescent rather than glabrous. The figure given by Miers is inaccurate, apparently representing some parts of materials derived from *E. nitens*, as was mentioned earlier. Miers illus-

trates separate clusters of hairs on the petals, which are characteristic of *E. nitens* and not of *E. glabrum*. He figures an extension of the connective beyond the anther-sacs, and Engler describes the same. I have seen no indication of this development in the isotypes of *E. glabrum*. Curiously Miers also illustrates a pubescent calyx, but in this case he makes no mention of this character in his description. His habit sketch of the plant, however, is a good representation of the present species.

Klug reports the plant to be a tree 25 feet tall, with cream flowers.

7. **Emmotum orbiculatum** (Benth.) Miers, Ann. Mag. Nat. Hist. II. **10**: 178. 1852, Contrib. Bot. **1**: 108. 1851-61.

Pogopetalum orbiculatum Benth. Trans. Linn. Soc. **18**: 685. 1841, Lond. Jour. Bot. **2**: 377. 1843.

Tree, the branches spreading, cinerous- to fulvo-tomentose; petioles stout, 1.2-1.5 cm. long, deeply sulcate; lamina ovate-orbicular, 7-8.5 cm. long, 6.5 cm. broad, glabrous and shining above except in the sulcate midrib, fulvo-tomentose below, the apex obtuse or slightly mucronate, the base rounded, the margin slightly revolute, the midrib sulcate, the lateral veins 6 pairs, parallel, arcuate toward the margin, free at the ends; inflorescence to 2 cm. long; calyx puberulent, the lobes ovate; petals ovate, 4 mm. long, pubescent outside, barbate or lanate inside; stamens shorter than the petals, the anthers oblong-ovate, the thecae approximate at the apex, slightly separated at the base; ovary globose, hispid, 3-loculed; style eccentric, glabrous; drupe depressed-globose, 1-celled.

ILLUSTRATION: Benth. Trans. Linn. Soc. **18**: t. 42. 1841.

This species is based on a Schomburgk specimen from the Padawire (Padaury) River, a northern tributary of the Rio Negro in Amazonas, Brazil. In his Fauna and Flora of British Guiana, Richard Schomburgk reports the collections as from the "vicinity of Roraima." I have seen no authentic material nor specimens referable to this species. In Bentham's original plate the ovary is clearly figured as pubescent and described in the text as hispid. Engler (in Mart. Fl. Bras. **12**(2): 45. 1872) referred a Spruce collection here and emended the description of Bentham to describe a glabrous ovary. Since throughout the genus the presence or absence of pubescence seems to be a good specific character, it is probable that Engler improperly included more than one species in his concept of *E. orbiculatum*. The glabrous form which was included by Engler in Bentham's species I have segregated as *E. nudum*. The true *E. orbiculatum* may be recognized by the hispid ovary. The orbicular leaves are almost unique in the genus.

When Miers treated *E. orbiculatum*, he cited a specimen collected on the Rio Preto in Pernambuco by Gardner (2941) as referable to this species. However he also cited the same number under *E. nitens*. The same collection was previously cited by Bentham in the original description of *E. nitens*. Engler refers *E. orbiculatum* to both Pernambuco and Brazilian Guiana on the basis of the Gardner specimen. While I have not seen this material, it is evident that Miers made an error and that the Gardner material belongs in *E. nitens*. *E. orbiculatum* is apparently known only from the original collection.

8. **Emmotum holosericeum** Ducke, Arch. Inst. Biol. Veg. Rio 4: 45. 1938.

Tree, the branches terete, longitudinally striate, densely red-brown-tomentose when young, becoming glabrate; petioles stout, 2–3 cm. long, strongly sulcate above, longitudinally ridged, densely brown-tomentose; lamina ovate to broadly elliptic-ovate, 10–22 cm. long, 8–13 cm. broad, densely golden-brown-tomentose above when young, becoming glabrate and shining except in the sulca of the midrib, below densely golden- or brownish-sericeous-pilose, not becoming glabrate, the midrib deeply sulcate above, prominent below, densely pubescent, the lateral veins 10–12 pairs, sulcate above, conspicuous below, parallel, arcuate only near the margins, free at the ends, the apex acute, rarely acuminate or obtuse, the base rounded, the margin revolute; panicle 2–4.5 cm. long in fruit, stout, densely pubescent; flowers not known; drupe depressed-globose, sparsely short-pilose, 2.0 cm. in diameter, the mesocarp thin, fleshy, the putamen woody, 2.3 mm. thick, the locules three, evenly developed and regularly spaced, the seeds one in each locule.

TYPE COLLECTION: *Ducke 35548*, from Borba, Rio Madeira, Amazonas, Brazil.

BRAZIL: Amazonas: Borba, Rio Madeira, April 7, 1936, *Ducke 35548* (US, ISOTYPE), *Ducke 289* (NY).

Careful examination of the mature fruit of this species shows the presence of a few scattered hairs. It is assumed, therefore, that the pistil was likewise pubescent and that the affinities of this species must be with *E. orbiculatum* and *E. jagifolium* rather than with *E. acuminatum*.

These plants are readily identified by the beautiful dense golden-sericeous pubescence on the lower side of the leaf. This is found in an unreduced state in the oldest leaves on the sheets that I have seen. This is the only species of the genus for which I have seen mature wood specimens. Wood specimens are available at the Yale School of Forestry and microscope slides of the same in the Harvard wood collection.

It may be necessary to reconsider this species when more is known about *E. orbiculatum*. At present, *E. holosericeum* may be distinguished by its larger leaves, more numerous veins, and the striking golden-brown pubescence.

9. **Emmotum affine** Miers, Ann. Mag. Nat. Hist. II. 10: 180. 1852, Contrib. Bot. 1: 110. 1851–61.

Pogopetalum affine Planch. ex Miers, l.c.

Tree, the branches terete, the younger branches short-brown-strigose or hirsute-pubescent, becoming glabrate; petioles slender, 1–2 cm. long, narrowly sulcate above, short-brown-pubescent, becoming glabrate; lamina ovate, 8–12 cm. long, 4–7 cm. broad, hirsute above, becoming glabrate except near the base and in the sulca of the midrib, shining at maturity, densely short-brown-appressed-hirsute below, becoming glabrate, the midrib sulcate above and prominent below, the lateral veins 6–8 pairs, slightly sulcate, arcuate, free at the ends, the apex acute or attenuate, occasionally with a short mucro, the base rounded, the margin revolute; panicles 3 or 4, shorter than or equalling the petioles, densely brown-sericeous or strigose; calyx 2–3 mm. in diameter, deeply lobed, densely brown-sericeous, the lobes ovate, obtuse or acute at the apex, 1 mm. long; petals ovate-lanceolate, 4.5 mm. long, 1.5–1.7 mm. broad at maturity, densely sericeous or pilose

outside, inside red-brown-lanate; stamens 4–4.5 mm. long, the anthers ovate-oblong, 1–1.7 mm. long, the thecae flat or slightly recurved at the tip, approximate at the apex, frequently widely separated at the base, the connective fleshy, oblong, obtuse or rounded at the apex, rounded or cordate at the base, attached to the filament dorsally near the base; ovary globose, 1.2 mm. in diameter at anthesis, densely hirsute above, with a sterile glabrous area differentiated at the base, 3-loculed; styles 2.5–2.6 mm. long, glabrous, terminal or slightly eccentric, the apex rounded or slightly 3-lobed; fruit unknown.

TYPE COLLECTION: *Sellow* (Hook. Herb., not seen), from Brazil.

BRAZIL. Bahia: *Blanchet 1702* (FM, NY). Pernambuco: Prozeres, sandy soil of littoral zone, *Pickel 3125* (FM, G); Oct. 1930, *Pickel s.n.* (FM, G).

I have seen no authentic material of this species. I have been unable to find any other reference than Miers' to the Sellow specimen in literature and cannot determine in what state of Brazil it was collected.

Engler (in Mart. Fl. Bras. **12**(2): 45. 1872) referred this species with question to the synonymy of *E. acuminatum*. This latter species, however, has a glabrous ovary, ovate leaves with long acuminate apices which do not recurve, and is found in British Guiana and Amazonas, Brazil. *E. affine* has a pilose or hirsute ovary, smaller ovate leaves, which are acute or tapering at the apex or rarely with a short mucro, and the apex is usually curved downward as Miers mentions. Engler (l. c.) has referred the Blanchet specimen (1702) to *E. jagifolium*; however, in all its characters it is in agreement with *E. affine*.

10. *Emmotum conjunctum* sp. nov.

Arbor; ramulis subangulatis cinereo-pubescentibus; petiolis subteretibus 1–1.3 cm. longis sulcatis; laminis oblongis vel ellipticis, 7–8 cm. longis, 2.5–3.5 cm. latis, supra nitidis glabris nervo medio sulcato notatis, subtus pallidis breviter sericeis, nervis lateralibus 12 vel 13 subprominentibus pinnatis parallelis marginem versus arcuatis anastomosantibus, apice acutis cum mucroni 5–9 mm. longo deflexo ornatis, basi rotundatis, margine revolutis; paniculis 5–7 fasciculatis brevibus 4–10 mm. longis breviter sericeis; calyce campanulato sericeo 2 mm. diametro, lobis ovatis 1 mm. altis; petalis lanceolato-oblongis, 6–6.3 mm. longis, 2 mm. latis, extus dense sericeis, intus cum costa rufo-lanata instructis; staminibus 5–5.4 mm. longis, antheris ovato-oblongis 1.5–1.8 mm. longis, thecis planis, filamentis crassulis 1 mm. latis; ovario globoso 3-loculato 1 mm. diametro, sub anthesi 1–1.3 mm. longo, supra dense hirsuto, ad basim glabro; stylo subterminali 3.6–4.0 mm. longo glabro; fructu ignoto.

ILLUSTRATION: Plate 3.

VENEZUELA. Amazonas: Mt. Auyan-Tepui, alt. 1100 m., Dec.–Jan. 1937–38, *Tate 1354* (US, TYPE).

The bicolorous leaves with strongly reflexed apices and slightly curved midribs, together with the short inflorescences, allow this species to be readily recognized. The leaf-apex is curved downward and most of the leaves are folded when pressed. This character is also present in *E. affine*. All other species of *Emmotum* examined have arcuate veins with the ends free, while *E. conjunctum* has the numerous veins straight, pinnate, parallel

but slightly arcuate near the margin, and noticeably anastomosing. The flower-parts are slightly larger and more pubescent than in other species. The style is essentially terminal in the flowers seen.

The closest relationship of this species is probably with *E. fulvum*, from the vicinity of Mt. Roraima.

11. ***Emmotum fagifolium*** Desv. ex Hamilton, Prod. Fl. Ind. Occ. 29. 1825; Miers, Ann. Mag. Nat. Hist. II. **10**: 179. 1852, Contrib. Bot. **1**: 109. 1851-61; Engler in Mart. Fl. Bras. **12**(2): 45. 1872; Le Cointe, Arvores e Plantas Uteis, 457. 1934. *Pogopetalum acutum* Benth. Lond. Jour. Bot. **2**: 377. 1843; Miers, Ann. Mag. Nat. Hist. II. **10**: 176. 1852.

Trees, the branches terete, brown-tomentose to short-brown-sericeous, becoming glabrate; petioles 1-1.5 cm. long, puberulent, becoming glabrate, sulcate above; lamina lanceolate-oblong to elliptic or rarely ovate-oblong, 9-18 cm. long, 4-8 cm. broad, tomentose above, becoming glabrate, frequently shining, concolorous, brown-sericeous or tomentose, and becoming glabrate below, the midrib sulcate above and prominent below, the veins 9-11 pairs, slightly sulcate above, prominent below, tomentose or long-sericeous, arcuate and free at the ends, the apex abruptly acute, rarely acuminate, extending to a mucronate point 1-1.5 cm. long, the base rounded or subtruncate, the margin slightly revolute; panicles much shorter than the petioles, white-sericeous; calyx campanulate, 2 mm. in diameter, 1-1.5 mm. high, short-white-sericeous, the lobes triangular, usually obtuse at the apex; petals lanceolate-oblong, 4.5-6 mm. long, 1-1.4 mm. broad, densely sericeous outside, lanate inside; stamens 4.5-6 mm. long, the anthers oblong or ovate-oblong, 1-1.2 mm. long, the thecae flat, equally separate at the base and the apex or slightly cordate at the base; pistil symmetrical, 4.5-6 mm. long, the ovary globose, 1-1.5 mm. in diameter at anthesis, hirsute above, with a differentiated glabrous area at the base, the style glabrous, 2-4.5 mm. long, the apex rounded, rarely 3-lobed; fruit unknown.

TYPE LOCALITY: "Guyana" (Hamilton).

ILLUSTRATIONS: Miers, Contrib. Bot. **1**: t. 21. 1851-61; Baillon, Hist. Pl. **5**: 278. 1874; Baillon, Adansonia **2**: t. 9. 1862, as *Pogopetalum acutum*.

FRENCH GUIANA. *Lepricur* 264 (FM); *Martin* ex Hook. Herb. (G). BRITISH GUIANA. Mazaruni, *Sandwith* 1547 (NY, US); Demerara River, *Jenman* 4867 (NY), 6280 (NY); Demerara River, *Schomburgk* s.n. (C); Barima River, *La Cruz* 3375 (C, FM, G, NY, US); Mouth of Kako river, upper Mazaruni, *Pinkus* 193 (NY). BRAZIL. Pará: Peixeboi, *Sigueira* 9652 (US); Pará, *Ducke* 15696 (US), 15805 (US). Maranhão: *Snethlage* 341 (FM).

VERNACULAR NAMES: Bois d'Agouti, harriri n. 'ahading, muirachimbé, muira-ximbé, pao de ramo.

Miers refers to the glabrous base of the ovary as an "adnate cup-shaped disk"; however, the tissue forming this sterile area, although differentiated from the rest of the ovarian wall, is not free as in *Mappia* and is a portion of the pistil. I do not believe this should be called a disk.

The pubescence of the ovary is reduced in amount in several specimens I have seen. In the collections by Martin and Sandwith only a dense ring of hairs remains around the base of the style, the rest of the ovary being glabrous.

12. *Emmotum fulvum* sp. nov.

Arbor; ramis teretibus dense et crispe cinereo-pilosis aut hirsutis; petiolis angulatis 1.5 cm. longis crassis late sulcatis dense hirsutis; laminis ellipticis, 10–14 cm. longis, 4.5–6 cm. latis, supra glabris nitidis nervo medio sulcato hirsuto notatis, subtus dense pilosis aut hirsutis nervum medium prominentem et nervos laterales 7 prominentes arcuatos ad apicem liberos gerentibus, apice acutis mucronatis, basi rotundatis, margine revolutis; paniculis 1–1.5 cm. longis dense fulvo-pilosis aut tomentosis; calyce campanulato, 2 mm. diametro, 2 mm. alto, dense fulvo-piloso, lobis ovatis acutis 1 mm. longis; petalis ovato-lanceolatis, 5.8–6.1 mm. longis, 1–1.2 mm. latis, extus dense fulvo-pilosis, intus fusco-lanatis; staminibus 5–5.3 mm. longis, antheris oblongis 1–1.3 mm. longis, thecis planis; ovario globoso 2 mm. diametro dense fulvo- vel argenteo-hirsuto; stylo subterminali glabro 3–3.4 mm. longo; fructu drupaceo submaturo globoso 1 cm. diametro sparse hirsuto, sarcocarpio 1 mm. crasso, endocarpio osseo 1-loculato, semine in quoque loculo solitario.

ILLUSTRATION: Plate 4.

VENEZUELA. Amazonas: Arabupu, vicinity of Mt. Roraima, alt. 4200 ft., Dec. 21, 1938, *Pinkus* 87 (FM ISOTYPE, NY TYPE).

Pinkus reports this plant to be a tree 36 feet high, with a trunk diameter of 8 inches. The calyx and corolla are covered with a yellow-brown pubescence and the anthers and pistil are said to be white. It occurs in mixed forests on clay soil.

This species is near *E. fagifolium* and *E. conjunctum*. It differs from both of these and is characterized by having a dense yellow-brown pubescence on the perianth-parts as well as on the axis and bracts of the inflorescence, and by lacking the conspicuous sterile fleshy base to the pistil.

SPECIES EXCLUDED

EMMOTUM APOGON Griseb. Abhandl. Ges. Wiss. Goetting. **24**: 149. 1879 = *Citronella apogon* (Griseb.) Howard.

EXPLANATION OF PLATES

PLATE I

Emmotum nudum Howard (*Ducke 11367*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Glabrous pistil with a basal ring of differentiated sterile tissue, $\times 10$; 3-5. Lateral, abaxial, and adaxial views of the stamens with dithecal anthers, $\times 10$; 6. Pubescent calyx, $\times 10$; 7. Side view of a mature drupe, $\times 1$; 8. Basal view of a mature drupe showing the lobed margin and the minute persistent calyx, $\times 1$; 9. Diagrammatic cross-section of the ovary showing the three eccentric locules with two ovules in each locule, $\times 15$; 10. Abaxial view of the petal taken from a mature bud, $\times 12$; 11. Lateral view of a petal showing the lanate pubescence on the raised midrib, $\times 9$; 12. Adaxial view of a petal after anthesis, $\times 9$.

PLATE II

Emmotum floribundum Howard (*Klug 1212*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2, 3. Adaxial and lateral views of petals after anthesis, $\times 8$; 4. Glabrous pistil, $\times 12$; 5-7. Lateral, abaxial, and adaxial views of stamens, $\times 10$. Fig. 7 shows the longitudinal dehiscence of the anther-sacs along the junction with the connective.

PLATE III

Emmotum conjunctum Howard (*Tate 1354*)

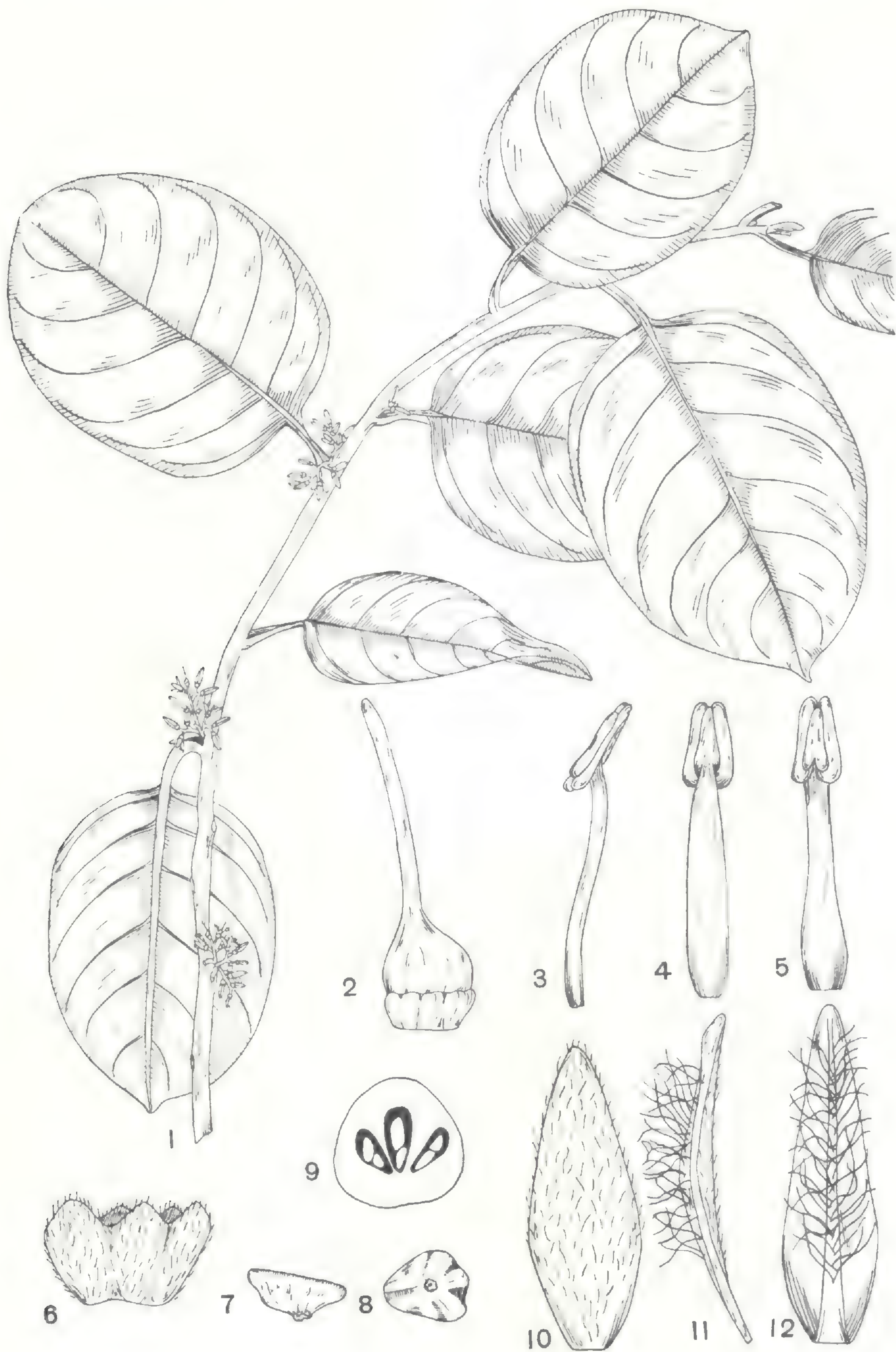
Fig. 1. Habit, $\times \frac{1}{2}$; 2, 3. Adaxial and lateral views of petals after anthesis, $\times 7$; 4. Pistil showing the hirsute ovary, the differentiated glabrous basal sterile ring of tissue, and the glabrous style, $\times 10$; 5. Calyx, $\times 7$; 6-8. Lateral, abaxial, and adaxial views of the stamens, $\times 9$.

PLATE IV

Emmotum fulvum Howard (*Pinkus 87*)

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Pistil showing the hirsute ovary with an undifferentiated base, $\times 12$; 3, 4. Adaxial and lateral views of a stamen, $\times 9$; 5. Pedicel and calyx showing the floral articulation immediately subtending the calyx and the bracts on the pedicel, $\times 7$; 6, 7. Diagrammatic cross and longitudinal sections of the ovary showing the three eccentric locules, each with two anatropous ovules pendent from near the apex, $\times 10$.

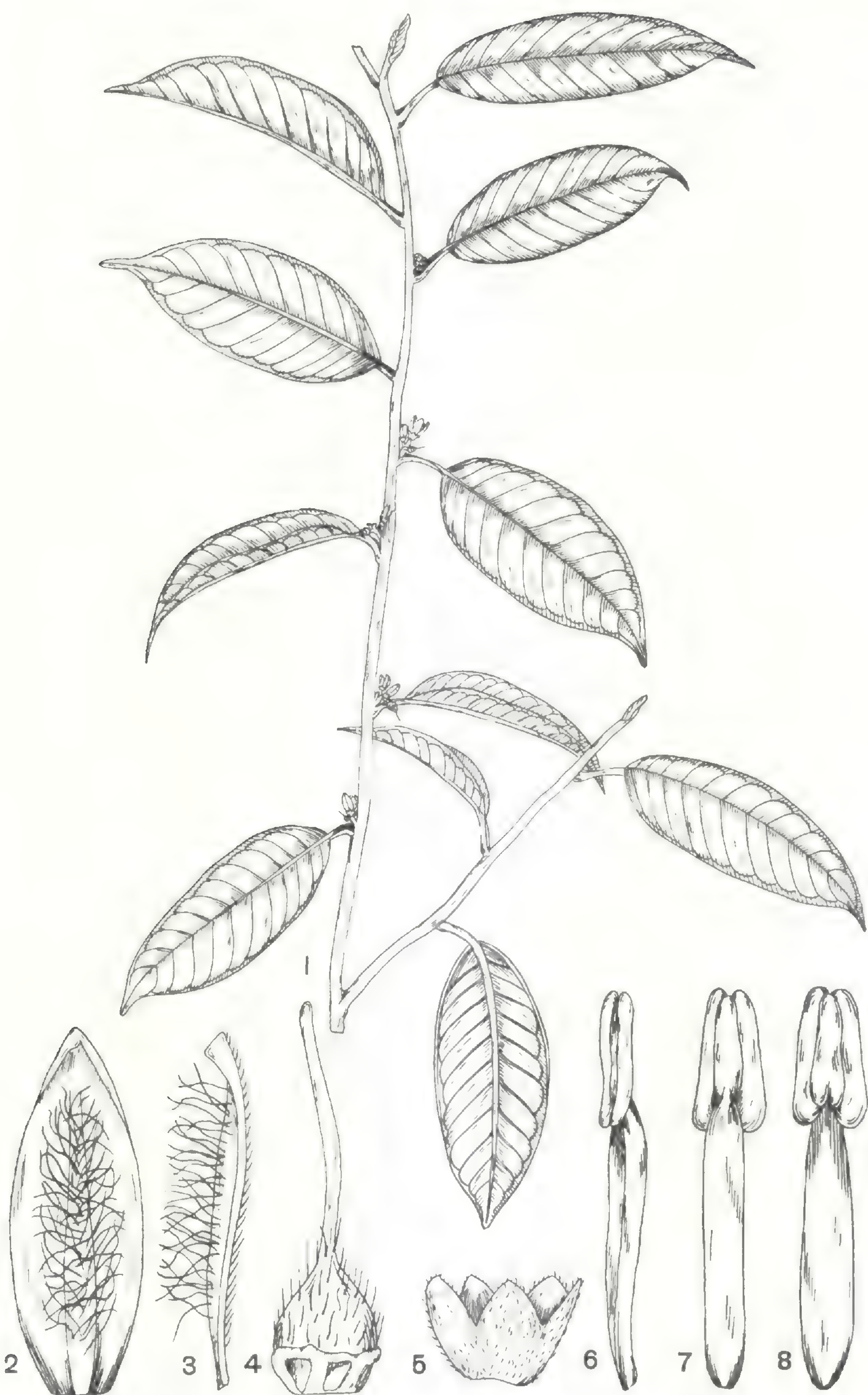
GRAY HERBARIUM,
HARVARD UNIVERSITY.



EMMOTUM NUDUM Howard



EMMOTUM FLORIBUNDUM Howard



EMMOTUM CONJUNCTUM Howard



EMMOTUM FULVUM Howard

NEW AND CRITICAL EUPHORBIACEAE FROM
THE TROPICAL FAR EAST

LEON CROIZAT

THE material dealt with in this paper belongs to the herbarium of the Arnold Arboretum of Harvard University and has been studied in the course of normal herbarium routine. In a recently published contribution on *Croton* L. in Guatemala (in Publ. Field Mus. Nat. Hist. Bot. Ser. **22**: 446–448. 1942), as well as in another on certain Euphorbiaceae of Texas (in Bull. Torrey Club **69**: 446–447. 1942), I have found reason to comment on the speciation taking place in this genus in the American range. Precisely the same order of facts is discernible in Asia that obtains on our continent; species of *Croton* which are identical or almost identical in their foliage turn out to have different ♀ flowers and capsules when carefully studied. Likewise, species that are apparently unrelated appear, whenever material is available, to be connected by endless intermediates which differ, each in its turn, by sums of minor characters if not of sheer intangibles. To deny recognition to such forms is neither possible or advisable, but to place them accurately, whether as species, subspecies, or varieties proves now impossible. As a compromise, which remains to be tested by field work and experimental cultivation, I have accepted for *Croton* a comparatively narrow specific concept in publishing some of the species in this paper.

CROTON Linnaeus

***Croton adumbratus* sp. nov.**

Frutex videtur vel arbuscula. Innovationibus furfuraceo-lepidotis, rufescentibus vel subargenteis. Foliis ovato-ellipticis vel elliptico-lanceolatis, apice cuspidatis, basi cuneatis obscure auriculatis, 8–20 cm. longis, 3–8 cm. latis, in sicco supra brunneis, glabris, subtus totis lepidotis, lepidibus centro brunneis quapropter indumento opaco, nervis primariis ca. 8-jugis, primo jugo adscendente caeteris patentibus, omnibus sub margine anastomosatis, sat tenuibus; petiolo 1.5–5 cm. longo, glandulis posticis 2 subsessilibus, patelliformibus. Inflorescentia subsimplici, spicata, 2-sexuali. Floribus ♂ in alabastro ca. 2 mm. magnis, pedicello in anthesi ca. 3 mm. longo. Floribus ♀: perianthio ovarium tenellum totum occultante ca. 6 mm. magno, pedicello in anthesi ca. 3 mm. longo, sub fructu ad 5 mm. longo, lobis ligulatis, apice subcucullato-incrassatis, disco e glandulis 5 discretis; ovario globuloso ca. 2 mm. magno, lepidoto, stylis iterum partitis, capsula rufescente tomentella, indumento detergibili, globulosa, sulcata ca. 7 mm. magna.

MALAY PENINSULA: *Griffith s.n.* (TYPE); *Maingay 1378*; *Griffith 4777*. SUMATRA: East Coast, *H. S. Yates 754*; *Rahmat si Toroes 1426*; *Rahmat si Boeea*; *Krukoff 239* in 1930; *Krukoff 4022, 4281* in 1932.

Griffith 4777 is cited by Hooker, Fl. Brit. Ind. **5**: 391. 1887, under *Croton erythrostachyus*. The specimens which I have seen under this number are

a mixture of *C. erythrostachyus* Hook. f. and *C. adumbratus*. The Griffith material from Malacca was correctly indicated as "*Croton* sp. nov.," but was later misdetermined as *C. argyratus* Bl. Hooker evidently confused under *C. argyratus* at least two species, Blume's authentic plant and *C. adumbratus*, it being likely that his concept (Fl. Brit. Ind. 5: 385. 1887), is based upon the latter rather than upon the former. My understanding of *C. argyratus* rests upon the following collections: (1) *Koorders 15685 B*, from the range of the classic locality ("ad montem Parang Prov. Tjanjor," Blume, Bijdr. 602. 1825 — apparently Mt. Karang near Tjiandoer of modern maps); (2) *Collector unknown*, Java, Sept. 1930, a duplicate from the Paris herbarium, probably wrongly dated, and possibly a century older than the year given by the label implies; (3) *Bangham 1092*, Sumatra, road from Kaban Dtjake to Kata Tjane; this collection is in fruit, the rather hard capsule being about 1.5 cm. long and broad, thus tallying with the size, "capsulae 15 mm. longae" given by Mueller-Argoviensis (in DC. Prodr. 15[2]: 527. 1866) for the fruit of *C. argyratus* var. *genuinus*. Despite a superficial resemblance with *C. argyratus*, this new species differs from it in the much weaker and smaller capsule and in minor details of the indument and of the ♀ calyx, being nearer, on the whole, to *C. potabilis* Croizat. It is probable that the majority of the references to *C. argyratus* in the Malayan peninsula apply to *C. adumbratus*.

***Croton biaroensis* sp. nov.**

Frutex vel arbor. Innovationibus plus minusve lepidotis, indumento citius deciduo. Foliis late ellipticis vel ovato-ellipticis, apice sensim acuminatis, basi cuneatis vel cuneato-rotundatis, 10–16 cm. longis, 4–5 cm. latis, in sicco lutescentibus vel brunnescentibus subcoriaceis firmis glabris, margine primo intuitu integris parcius repando-dentatis, nervis primariis patentibus, obscure anastomosantibus 8–11-jugis, petiolo crassiusculo glabro, 2–2.5 cm. longo, glandulis posticis 2 sessilibus parvis. Inflorescentia simplici, gracili, ca. 10–12 cm. longa, 2-sexuali. Floribus ♂ in alabastro ca. 2 mm. magnis, pedicello ca. 2 mm. longo. Floribus ♀: perianthio 3 mm. longo, 3.5–4 mm. lato, pedicello ca. 2 mm. longo, lobis lanceolatis vel ellipticis acuminatis crassiusculis integerrimis, 2.5 mm. longis, 1 mm. latis; ovario globuloso, ca. 2 mm. magno, luteo-lepidoto, lepidibus sat latis fructu ineunte in epicarpio dissitis, stylis 3 dorso valde lepidotis ca. 2 mm. longis, tertio infero connatis, apice bifidis, planis, brunneis.

BIARO (north of Celebes): *E. Nielsen 812*, 1929 (TYPE). CELEBES: Minahassa, Bojong, *Warburg 15554*, 1898.

The Warburg collection was distributed as *C. laevifolius* Bl., which this new species but superficially resembles, as it is near *C. glabrescens* Miq., and probably also related to *C. erythrostachyus* Hook. f. It appears to be a localized endemic with affinities toward *C. leytenensis* Croiz. that require further study.

***Croton oreoborneicus* sp. nov.**

Arbor videtur vel frutex magnus ad 40 ped. altus. Innovationibus glabris, valde immaturis pilis pluriradiatis grossis brunneis obsitis, serius glabris. Foliis ellipticis, apice late acutatis, basi longius cuneatis, 8–20 cm.

longis, 3–6 cm. latis, in sicco pallide olivaceis, firme chartaceis, glabris, nervis primariis ca. 8-jugis, primo jugo abrupte caeteris late adscendentibus, margine primo intuito integro, sub lente haud obvie denticulato vel repandulo; petiolo gracili, 1–6 cm. longo, glabrato, glandulis posticis 2 sessilibus patelliformibus. Inflorescentia ob cymas vulgo plures subspicatas terminales habitu paniculata sat ampla. Floribus ♂ in holotypo nullis, at videtur (e *Clemens* 20335) delicatis, vix ultra 2 mm. magnis, petalis sepalis aequilongis, pedicello subfiliformi ca. 3 mm. longo. Floribus ♀: perianthio ca. 2 mm. lato, 2–3 mm. longo, glandulis disci 5 extus tumescentibus perspicuis quapropter lobis basi primo intuito incrassatis, lobis ipsis triangularibus 1.5 mm. longis, 1 mm. latis, petalis nullis; ovario luteolepidoto 1.25 mm. longo, 2 mm. lato, stylis 3 fere e basi liberis, quove 0.75 mm. integro, dein 1.75 mm. partito; fructus delapsi coccis ad 7 mm. longis, delicatis, columella ad 5 mm. longa, seminibus brunneis, apice verruculosus, caruncula lineari ad hilum excurrente, ca. 5 mm. longis, 4 mm. latis.

BRITISH NORTH BORNEO: *Agama* 568, 1918 (TYPE).

Here to all appearances also belong: Sarawak: *Native Collector* 1744; Kina-bagatan: *Evangelista* 1006, 1929; Sarawak: Mt. Poi: *Clemens* 20335, 1929.

Few other species are so critical as *C. laevifolius* Bl., for around it, as around *C. argyratus* Bl. and many other forms of *Croton*, are countless entities which may appear almost identical in their gross morphology but are basically different in the characters of their ♀ flowers and fruits. It proves impossible for this very reason to accept *C. oblongum* Burm. f. as the legitimate binomial of the entity usually recognized as *C. laevifolius* Bl. before having made a critical study of the plant that might be preserved in the herbarium of Burman at Geneva under this name. Corner is justified, to all appearances, in treating (in Gard. Bull. Straits Settl. **10**: 294. 1939) *C. Griffithii* Hook. f. and *C. confusum* Gage as synonyms of *C. laevifolius*, the material I have seen supporting his conclusion. *Croton tiglioides* Bl., listed with doubt by J. J. Smith (Meded. Dept. Landb. **10**: 341. 1910) in the synonymy of *C. laevifolius*, seems actually to belong where Smith puts it, to judge from a specimen so named which I saw in the Paris herbarium and is now represented in our collections by a fragment, the gift of Prof. Henri Humbert.

Croton oreoborneicus essentially differs from *C. laevifolius* in the apparently much larger disc of the ♀ flower and in some intangibles of habit and foliage. It remains to be seen whether these characters are specific. The publications of varieties and trinomials is not advisable at this stage of investigation on account of the reasons briefly outlined in the introduction to this paper.

***Croton tawaoensis* sp. nov.**

Videtur arbor. Innovationibus grosse parciusque stellato-tomentosis, citius glabratibus. Foliis late ellipticis vel ellipticis, interdum subovalibus, apice basique plus minusve longe acutatis vel cuneatis, 10–24 cm. longis, 3.5–8 cm. latis, glabris, in sicco pallide olivaceis vel badiis, firme chartaceis vel subcoriaceis, margine subintegro revolutis, nervis primariis 6–8-jugis utrinque tenuibus late adscendentibus, anastomosatis; petiolis longitudine valde ludentibus, 1–6 cm. longis, glandulis in petioli apice anticis 2 brevis-

sime stipitatis vel baculiformibus. Inflorescentia floribusque in holotypo haud suppeditantibus: capsula visa juniore, trigona, coccis apice gibbosis, solutis ad 8 mm. longis, endocarpio firmo osseo, exocarpio subtili toto ochraceo valde verrucoso stellato-tomentoso vel furfuraceo-lepidoto, semine ellipsoideo, ca. 7 mm. longo, 4–5 mm. crasso, sub lente acri testa verruculosa vel striata ad carunculam indumento peculiari e trichomatibus stellatis lutescentibus induta.

BRITISH NORTH BORNEO: Tawao, Elphinstone, *A. D. Elmer* 21559, 1923 (TYPE); distributed as *C. oblongum* Burm. f.

It would be impossible to separate this species from *C. laevifolius* Bl. and the forms in its vicinity but for the nature of the fruit. As stated previously, the foliage is practically the same and the flowers mostly differ in minute characters in the plants of this and allied groups. However, the epicarp sharply differs; in *C. laevifolius* it is smooth and sparingly stellate-tomentose to glabrous, while it is rough and verrucose, thickly tomentose to scurfy in *C. tawaoensis*. Such a difference I accept as fully specific, for to neglect it would call for the conclusion that the whole Sect. *Gymnocroton* Baill., which ranges from Assam, in N. E. India, to the Fiji Islands and Australia, consists of but one species. I suspect that *Villamil* 379, also collected in British Borneo and distributed as *C. laevifolius*, may prove to be *C. tawaoensis*; the indumentum on its ovary is thicker and coarser and has a much darker color than is usual for *C. laevifolius*.

***Croton avellaneus* sp. nov.**

Frutex vel arbor videtur ex affinitate proxima *C. argyrati* Bl., quocum notis vegetativis totis optime quadrat, licet foliis 6–10 cm. longis, 3–7 cm. latis, supra brunneis subtus totis fusco-argenteis, innovationibus lepidibus cupreis plus minusve dense indutis. Floribus haud visis: pedicello sub fructu crassiusculo ad 1 cm. longo, lobis perianthii ellipticis apice dilatatis integerrimis ad 5–6 mm. longis, columella sat gracili ad 10 mm. longa; capsula basi coarctata apice applanato-subtruncata, ca. 12 mm. longa, 10 mm. crassa, in coccorum dorso atque in dissepimentibus quoad visa lineata vel costulata revera haud trigona, epicarpio glabrescente brunneo, sat tenui, secedibili, endocarpio fragili; semine brunneo opaco scaraboideo, 9 mm. longo, 7 mm. lato, caruncula umbonata in arillum circumcircum confluenta, valde depressa, albo-cincta, testa grosse at haud profunde costulato-rugosa.

PHILIPPINE ISLANDS: Sulu Archipelago: Tawitawi, *Ramos & Edaño* 43977, 1924 (TYPE).

The Bornean plant represented by *Castro & Melegrito* 1565, 1923, from Banguay Island, British North Borneo, and *J. & M. S. Clemens* 20099, 1929, from Mount Poi, British North Borneo, probably belongs here despite slight differences in the size of the capsule. *Elmer* 21201, also from British North Borneo (Tawao), almost certainly belongs to *C. avellaneus*. Its ♀ flower has a perianth which is manifestly larger and coarser than that of *C. argyratus*, that is about 7 mm. long and 10 mm. wide, against a length of 4 mm. and a breadth of 6 mm. for Blume's species. The capsule of the type, *Ramos & Edaño* 43977, is essentially coarser and larger than that of *C. argyratus*.

***Croton babuyanensis* sp. nov.**

Frutex videtur vel arbuscula. Innovationibus argillaceo-tomentosis, colore cupreatis cortice vetustiore albicanti. Foliis late ellipticis, apice breviter acuminatis, basi rotundato-cuneatis, integris, supra glabris brunneis, subtus conferte argenteo-lepidotis, nervis interdum laetius coloratis, firme chartaceis, primariis 4–6-jugis adscendentibus, petiolo 1–3 cm. longo glandulis posticis sessilibus obscuris. Inflorescentia simplici 2-sexuali spicata. Floribus ♂ ignotis. Floribus ♀: perianthio ca. 4 mm. lato et 3 mm. lato, *ovarium haud includente* (qua nota a speciebus in *C. argyrati* affinitate primo intuitu abhorret), pedicello ca. 3 mm. longo, lobis triangulari-acuminatis vel rarius ellipticis interdum apice incrassatis, costulato-venosis, ovario 3 mm. crasso, 2.5 mm. longo, cupreato-lepidoto, stylis visis valde mancis.

PHILIPPINE ISLANDS: *Babuyan Group*: Island of Dalupiri, *Bartlett 15086*, 1935 (TYPE); distributed as *C. argyratus* Bl.

A strong species, with a perianth that fails to inclose the ovary. Its characters suggest the Indo-Chinese *C. kongensis* Gagnepain, and its only known ally in the Philippines is *C. Novae-Astigis* Croiz., from the Province of Nueva-Ecija in Luzon, which appears to be less of a xerophyte and has ♀ flowers with much longer pedicels.

***Croton Novae-Astigis* sp. nov.**

Arbuscula vel frutex. Innovationibus lepidoto-tomentosis vel lepidotis rubiginosis, citius glabratis. Foliis late ovatis, breviter vel brevissime apiculatis vel cuspidatis, basi obscure cordatis rotundatis vel subpeltatis, margine obiter distanctaque sub lente serratis, firme chartaceis, 12–15 cm. longis, 3.5–5 cm. latis, supra brunneis glabratis vel glabris, subtus argenteo-lepidotis, nervis utrinque ca. 7-jugis rubiginosis, primo jugo ramoso; petiolo sat crasso, 2.5–4.5 cm. longo, apice glandulis 2 posticis optime sessilibus supra limbi parte peltata sitis insignito. Inflorescentia simplici spicata. Floribus ♂ haud visis. Floribus ♀: perianthio vix 3 mm. longo ovarium haud includente, 4 mm. lato, pedicello evidenti ad 5–7 mm. longo, lobis lanceolatis, breviter acuminatis secus medium nervosis, carnosulis, disco e glandulis 5 sat magnis discretis, impressis, ad tori centrum positis, ovario cylindrico-ovoideo ca. 2.5 mm. magno, toto lepidoto, stylis 3 ad basim imam partitis quapropter primo intuitu ut videtur 6, ca. 2 mm. longis, carneis neque nigricantibus, dorso sublepidotis.

PHILIPPINE ISLANDS: *Luzon*: Province of Nueva-Ecija, Mt. Napu, *Alcasid & Edaño 5341*, 1939 (TYPE); distributed as *Mallotus ricinoides*.

Related to *C. babuyanensis*, described above, but having larger leaves, a somewhat different indumentum, and, primarily, a much longer pedicel under the ♀ flower. The specific epithet is the Latinized version of the name of the Province from which the type-collection has come.

***Croton batangasensis* sp. nov.**

Frutex vel arbuscula. Innovationibus griseo-tomentosis vel argenteo-sublepidotis, frequentius tomentosis. Foliis plus minusve late lanceolato-ellipticis, apice breviuscule acuminatis, basi rotundatis subauriculatis, auricula altera interdum longiore, 5–9 cm. longis, 3.5–5 cm. latis, supra brunneis glabris, subtus griseo-canescens, indumento sublepidoto, margine primo intuitu subintegro sub lente sat crebre repando-serrato, nervis pri-

mariis ca. 7-9-jugis, primo jugo valde diminuto, sequente valde adscendente ramoso, caeteris primis adscendentibus demum sub apicem laminae latius patentibus; petiolo tomentoso 1.5-3.5 cm. longo, apice glandulis 2 posticis sessilibus insignito. Inflorescentia simplici spicata. Floribus ♂ haud visis. Floribus ♀: perianthio cupulato, ovarium totum occultante ca. 5 mm. magno, lobis imbricativis ad basim nempe agglutinatis, ellipticis, ca. 3 mm. longis et 1.5 mm. latis, intus valde laqueato-venosis, glandula ad basim auctis squamiformi, disco dissito, petalis nullis, ovario globuloso ca. 2 mm. magno tomentello-lepidoto, stylis 3 in columnam brevissimam (0.75 mm.) primo connatis, dein liberis, bis dichotomis, crure summo 2.5-3 mm. longo; capsula submatura lepidota ca. 6 mm. magna, columella gracili 5 mm. longa.

PHILIPPINE ISLANDS: Luzon: Province of Batangas, *Ramos* 22371, 1914 (TYPE); distributed as *C. argyratus* Bl. var.

Quite unlike *C. argyratus* Bl. and reminiscent on the whole of *C. budopen-sis* Gagnep. from Indo-China.

***Croton cotabatensis* sp. nov.**

Arbor parva vel frutex intricatus videtur. Innovationibus lepidibus cupreis primo indutis, citius glabratis. Foliis habitu, textura, indumento, forma vix ab illis *C. argyrati* Bl. eruendis, ca. 12-15 cm. longis, 3.5-5 cm. latis, subtus totis lepidotis, nervis primariis ca. 7-jugis. Floribus ♂ haud visis. Floribus ♀: perianthio ovarium totum occultante, ca. 7 mm. longo, 7 mm. lato, pedicello vix 2 mm. longo, lobis fere ad basim partitis ligulatis carnosulis, intus stellato-tomentosis, ca. 6 mm. longis et 2 mm. latis, petalis setaceis manifestis, ovario lepidoto, globuloso, ca. 2 mm. magno, apice sub-truncato-dilatato subinde in columnam stylarem evidentem ad 1 mm. longam abeunte, crure quove partito ad 4-5 mm. longo.

PHILIPPINE ISLANDS: Mindanao: District of Cotabato, *Miranda* 18271, 1912 (TYPE).

Here belongs *Tarrosa, Miranda & Rafael* 18794, 1912, from the same district and, to all appearances, *Robinson* 11829, 1910, from the District of Zamboanga. The characters of the ♀ perianth are not those of *C. argyratus* and *C. Quisumbingianus*. From *C. cupreus* Elm. this new species appears to differ in the much longer and not sessile styles and in the larger perianth; a comparison of specimens in full fruit is desirable.

***Croton Quisumbingianus* sp. nov.**

Arbor vel arbuscula innovationibus cupreato-argenteis, cortice adultiore griseo rugoso cicatricoso. Foliis cum illis *C. cotabatensis* fere ad assem congruentibus, floribus ♀ autem aliis, scilicet: perianthio gracilius longiusque pedicellato, pedicello ad 5 mm. longo, lobis minoribus, magis delicatis, inde perianthio toto ca. 6 mm. longo et 5 mm. lato neque 7-8 mm. longo latoque, petalis nullis vel (forsan) subnullis, ovario depresso-globoso, 2 mm. longo, 3 mm. lato, stylis e basi ipsissima liberis neque in columnam evidentem connatis, crure quove primum ca. 1.5 mm. integro, dein dichotomo, crure summo 2.5-3 mm. longo.

PHILIPPINE ISLANDS: Leyte: *Wenzel* 1250, 1915 (TYPE).

Here also apparently belongs *Wenzel* 1538, 1915, from the same island. This is a very distinct species, with a delicate perianth, quite close to *C. potabilis* Croiz. from Indo-China, but not nearly allied with other species

of the Philippine Islands. I dedicate it to Dr. Eduardo Quisumbing of the Bureau of Science, Manila, to whom I am indebted for the communication of holotypic material and important data.

Croton cupreus Elm. in Leaf. Phil. Bot. 4: 1281, as *C. cuprea*. 1911.

Croton argyratus Merr., Enum. Phil. Fl. Pl. 2: 425. 1923, *p.p.*, non Blume.

Elmer's description is long but lacking in the essential data of the ♀ flower and the fruit. A dissection of a young fruit on an isotype, *Elmer* 13236, 1911, reveals that the ♀ perianth has petals matching those of *C. cotabatensis* but with lobes which are short and slender (about 3 mm. long and 1.5 mm. broad), and with styles that do not form a column but branch from the base and are not over 2 mm. long. The columella of a nearly ripe or ripe fruit is delicate, only 5 mm. long. In all these characters *C. cupreus* disagrees with *C. argyratus*. The foliage is thickish, with revolute margins, such as is frequently found in the xerophytic forms of the genus, and its "feeling," if not its color, is indeed reminiscent of *C. cascarilloides* Raeusch. (*C. Cumingii* Muell. Arg.), to which Elmer compares it.

Croton argyratus Bl. Bijdr. 602. 1825; Muell. Arg. in DC. Prodr. 15[2]: 526. 1866 (saltem quoad var. *genuinum*).

I have not seen specimens from the Philippine Islands which I can bring under this species. *Croton avellaneus* Croiz., described elsewhere in this paper, is the endemic to these islands which is nearest Blume's species, and it may be easily possible to treat it as a variety of *C. argyratus* by accepting a concept of specific limits which I am not ready to entertain for this group and region at present.

The exceedingly crude figure of *Croton racemosum* given by Burman f. (Fl. Ind. 206 [sphalm.: 306]. pl. 62, 2. 1768) suggests, in the shape of the leaf and in the perianth-like calyces, the habit of certain states of *C. argyratus*, and a study of the type that might be preserved in the herbarium of Geneva is advisable. The description of what Burman accepts as the typic form of the binomial consists merely of the note: "*Croton (racemosum)* foliis ovatis subserratis tomentosis, racemis terminalibus nudis . . . ex Java." As is known, the leaves of *C. argyratus* are not infrequently tomentose rather than silvery-lepidote underneath.

Croton rectipilus sp. nov.

Frutex vel arbuscula magnitudine ignota. Innovationibus hispidopubescentibus, trichomatibus pilo vulgo centrali elongato setuloso-stellatis, serius glabratis brunneis. Foliis elliptico-lanceolatis, in sicco olivaceo-discoloribus vel brunneis subconcoloribus, utrinque acuminatis, 7–13 cm. longis, 2.5–5 cm. latis, glabris vel glabratis, tenellis dissite tomentello-setulosis, margine primum ciliato, dein glabro, repandulo vel subintegro vel integro, nervis primariis 7–10-jugis adscendentibus, petiolo 1–3.5 cm. longo, gracili, hispido-tomentoso, apice glandulis 2 sessilibus patelliformibus aucto. Inflorescentia evoluta haud visa. Floribus ♂ in alabastro ca. 2 mm. magnis, pedicello 2.5 mm. longo, lobis 2 mm. longis, 1 mm. latis, petalis (ut videtur) nempe ligulis hyalinis ciliatulis ad 1 mm. longis, staminibus ca. 10.

PHILIPPINE ISLANDS: Luzon: Province of Batangas, *Ramos* 22356, 1914 (TYPE).

Mueller Argoviensis cites specimens of Cuming and Llanos (in DC. Prodr. **15**[2]: 621. 1866) for his *C. Verreauxii* Baill. var. *angustifolius*, which may or may not be the same as *Ramos* 22356, listed by Merrill (Enum. Phil. Fl. Pl. **2**: 427. 1923) under Mueller's trinomial. Mueller's concept of *C. Verreauxii* is manifestly too comprehensive, his treatment of *C. Storckii* Seem. as a variety of Baillon's species having been rejected long ago by most botanists concerned with this complex. I find no reason to maintain under *C. Verreauxii* the plant typified by *Ramos* 22356, because this plant differs from the true *C. Verreauxii* far more than does *C. Storckii*, the foliage and pubescence of *C. rectipilus* being wholly unlike those of the Australian *C. Verreauxii* var. *genuinus*. A poor specimen that may belong to *C. rectipilus* is *Merrill* 11547, 1922, from the Island of Golo, originally distributed as *C. leiophyllus*. This specimen should also be compared with *C. luzoniensis* Muell. Arg. var. *bataanensis* Croiz., described elsewhere in this paper.

***Croton pampangensis* sp. nov.**

Frutex videtur vel arbuscula, innovationibus primum dissite stellato-tomentosis, citissime glabris. Foliis tenuibus, lanceolatis vel elliptico-lanceolatis, basi arctius cuneatis, 5–10 cm. longis, 1–3 cm. latis, in sicco brunneo-olivaceis, tenellis trichomatibus stellatis parvis perpaucis adspersis, adultis glaberrimis, margine crenato-denticulatis, dentibus callosis ad 3 per 1 cm. longitudinis, nervis primariis ca. 8–11-jugis delicatis, adscendentibus, petiolo 1–3 cm. longo gracili, apice glandulis 2 stipitatis insignito. Inflorescentia spicata, 2-sexuali. Floribus ♂: perianthio ca. 2 mm. magno, pedicello gracili ad 1.5–2 mm. longo, lobis petalisque subaequilongis, staminibus ca. 10, toro vix lanuloso. Floribus ♀: perianthio pedicello vix 1 mm. longo fulto, ca. 2 mm. longo, 3–4 mm. lato, lobis imbricatis, plus minusve evolutis, glanduloso-punctatis, apice callosulis, integris, ovario 1.5 mm. longo, 1 mm. lato, stylis brevibus, ut videtur ad basim imam partitis.

PHILIPPINE ISLANDS: Luzon: Province of Pampanga, Apalit, *Ramos* 41649, 1923 (TYPE); distributed as *C. leiophyllum* Muell. Arg.

The resemblance between this new species and *C. phuquocensis* Croiz., from the island of Phu-quoc, at the southern tip of French Indo-China, is striking, only the glands at the upper end of the petiole serving to distinguish one from the other at sight. The floral characters are likewise altogether close in the two entities.

Croton pampangensis differs from *C. leiophyllus* Muell. Arg. in the very short-pedicelled to subsessile ♀ flower and in the details of the perianth. The nature of its pubescence and the serration separate it at sight from *C. rectipilus*.

***Croton leytensis* sp. nov.**

Frutex vel arbuscula ignotae magnitudinis. Innovationibus primum trichomatibus stellatis multiradiatis valde adpressis, dissitis, argenteis vel rubiginosis indutis, citius glabratis vel glabris. Foliis ellipticis apice late acuminatis basi cuneatis, 5–11 cm. longis, 1.5–5 cm. latis, margine repandulis vel subintegris, in sicco viridibus vel discolori-olivaceis, supra glabris, subtus glabratis, nervis primariis 5–7-jugis late patentibus, delicatis; petiolo

tomentello-lepidoto vel glabrato, 0.5–1.5 cm. longo, glandulis 2 patelliformibus subsessilibus anticis insignito. Inflorescentia subspicata. Floribus ♂ : perianthio 5 mm. lato, pedicello ca. 3 mm. longo, lobis late triangularibus vel ovatis, 2 mm. longis, 1.5 mm. latis, petalis brunneis ligulatis, 2 mm. longis, 1 mm. latis, staminibus ca. 11, toro vix lanuloso. Floribus ♀ : perianthio subfoliaceo ca. 5 mm. lato, 2 mm. longo, lobis triangularibus saltem marginibus virescentibus, 1.5 mm. longis, 1 mm. latis, quove ad basim glandula sat magna aucto, petalis nullis, ovario globuloso, 2 mm. magno, indumento sat grosso rubiginoso e trichomatibus sublepidotostellatis, stylis 3 e basi liberis, quove primum 1.5 mm. integro, dein 1.5 mm. partito, semine ca. 6 mm. longo et, 5 mm. lato, columella ca. 6 mm. longa, coccis fructus delapsi ca. 1 cm. longis, pericarpio hic inde indumento subevanido vestito.

PHILIPPINE ISLANDS: *Leyte*: Palo, *Elmer* 7133, 1906 (TYPE); distributed as *C. leiophyllus* Muell. Arg.

A very distinct species, not at all like *C. leiophyllus*, with obscure affinities, suggesting *C. biaroensis* Croiz. in the ♀ flower if not in the foliage. A sterile specimen, *Fénix* 28194, 1917, from Luzon, Apayao Subprovince, has a foliage that is reminiscent of that of *C. leytensis*, and despite the different range might ultimately be found to belong here.

Croton lancilimbus Merr. in Phil. Jour. Sci. **20**: 395. 1922, Enum. Phil. Fl. Pl. **2**: 426. 1923.

This outstanding species appears to be narrowly localized in the island of Basilan and in the adjacent Zamboanga District of the island of Mindanao (the type-locality). Its resemblance to *C. pontis* Croiz., from Tonkin, Indo-China, is striking, a connection between the *Croton* of the Philippine Islands and Indo-China being evident in this and four other species, *C. babuyanensis*, *C. Quisumbingianus*, *C. pampangensis*, and *C. batangasensis*.

Thanks to the friendly interest of Dr. Quisumbing, I have seen the holotype, *Ramos & Edaño* 36855. This collection is an excellent match for *Hutchinson* 3992, 1906, Basilan, which was distributed under the mis-determination *C. Verreauxii* var. *angustifolia*. Recent accessions which belong to this species are *Liborio Ela Ebaló* 912 and 929, 1941, both from the island of Basilan. The former is an absolute match of the holotype, and is reported by the collector to be a shrub along a creek, known in the Yakan language as "Nagus"; the latter bears at least one leaf fully 17 cm. long and 4 cm. wide, that is, larger than usual for the specimens I have so far seen. This collection (929) is described as a tree 5 m. high and about 5 cm. in diameter at the main stem, named in Yakan "Kalalayo." It is apparent that one and the same species is involved, despite the discrepancies in habit, size and vernacular names reported by the collector.

Croton consanguineus Muell. Arg. in Linnaea **34**: 101. 1865, in DC. Prodr. **15**[2]: 619. 1866; Merr. in Phil. Jour. Sci., Suppl. **1**: 78. 1906, Enum. Phil. Fl. Pl. **2**: 426. 1923.

Fragments of *Cuming* 1871, an isotype, collected at an unreported locality (see Merrill in Phil. Jour. Sci. **30**: 175. 1926), which is probably Leyte or South Luzon, are in our herbarium. These fragments are an excellent

match for the following collections, all distributed as *C. consanguineus*: *Wenzel* 1291, 1435, 1759, from Leyte; *Elmer* 15437, 15631, 17266, from Luzon, Province of Sorsogon, Irosin (Mt. Bulusan). In all these plants the indumentum is substantially the same; it consists of small grayish stellate trichomes, which even in the youngest leaves allow the glabrous under surface of the blade to show under the naked eye or the very weakest magnification. Adult leaves are scurfy-pitted underneath in a characteristic manner.

***Croton consanguineus* Muell. Arg. var. *molliusculus* var. nov.**

A planta typica quae indumento sat laxo subargillaceo gaudet (var. **genuinus** var. nov.), optime discedit indumento foliorum tomentello conferto molli, pedicello sub fructu paulo brevior, i.e. ca. 2 mm. (neque 3-6 mm.) longo.

PHILIPPINE ISLANDS: Luzon: Province of Cagayan, vicinity of Peñablanca, *Adduru* 28, 1917 (TYPE).

The material now available is insufficient to decide whether this peculiar plant, distributed as *C. luzoniensis* deserves a rank higher than varietal. The indumentum suggests *C. luzoniensis*, but the ♀ flower has the characters of that of *C. consanguineus*, differing only in the slightly shorter pedicel when in fruit. I do not believe that *C. luzoniensis* and *C. consanguineus* should be treated as one species, because their typic forms are clearly different. To bring these two entities together, a concept of species ought to be accepted which would automatically reduce *C. leiophyllus* Muell. Arg. to *C. laevifolius* Bl. and make impossible a critical classification of fully three-quarters of the forms of *Croton* endemic to eastern tropical Asia.

***Croton luzoniensis* Muell. Arg. in Linnaea 34: 118. 1865, in DC. Prodr. 15[2]: 624. 1866; Merr., Enum. Phil. Fl. Pl. 2: 427. 1923.**

An isotype, *Cuming* 1136, collected at Ilocos Sur, in Luzon, is represented in our herbarium by an excellent fragment. Very close to this plant, if not identical, are: *Ramos* 43078 and 43277, both from Bohol, and probably *Loher* 13288, Luzon, Province of Rizal, Montalban, represented in our collections only by a very poor specimen. These three sheets were mis-determined at distribution as *C. consanguineus*.

The indumentum of the typic form of *C. luzoniensis* is distinctly different from that of *C. consanguineus*. It consists of softish stellate hairs of light brown to orange color, thickly covering the innovations and both faces of the young leaf and in part persisting on mature leaves.

***Croton luzoniensis* Muell. Arg. var. *bataanensis* var. nov.**

A planta typica, quae foliis tenellis supra subtus molliter indutis statim dignoscitur (var. **genuinus** var. nov.), discedit foliis vix evolutis supra glaberrimis.

PHILIPPINE ISLANDS: Luzon: Province of Bataan, *Foxworthy* 10850, 1909 (TYPE).

The material has no ♀ flowers and cannot be placed with certainty on this account. It was originally distributed as *C. leiophyllus* Muell. Arg.,

which is apparently an error, as no forms of this species known to me have the softish stellate indumentum of *Foxworthy 10850*. This pubescence distinctly suggests *C. luzoniensis*, but Mueller's species has young leaves tomentose on both faces, not only underneath, which is an important differential character in *Croton*. So far as I can judge from the scanty material now available, *C. rectipilus* Croiz. is not this plant, because its pubescence is distinctly stellate-setulose, its young leaves being ciliate at the margins. More ample collections may show that a new species is involved here, rather than the variety of a known entity.

***Croton palawanensis* Merr. in sched. sp. nov.**

"*Croton* n. sp. in ms.," Elm. in Leaf. Phil. Bot. 4: 1281. 1911.

Croton heterocarpus sensu Merr. Enum. Phil. Fl. Pl. 2: 426. 1923; non Muell. Arg.

Arbuscula vel frutex lobis perianthii ♀ laxioribus exceptis, quoad visis, totus in floralibus cum *C. leiophyllo* Muell. Arg. optime congruens, sed foliorum notis insignis, primo intuitu pro specie propria pleno jure salutandus. Foliis ellipticis vel oblanceolato-ellipticis, 5–13 cm. longis, 2–6 cm. latis, pallide brunneis vel saepius olivaceis, evidenter coriaceis, margine revolutis obiterque crenato-serratis crenis ca. 2–3 per cm. longitudinis, venis adscendentibus ca. 8–jugis, gracilibus; petiolo 0.5–3 cm. longo, glandulis patelliformibus sessilibus cum folii epidermide confluentibus 2 posticis, in folio ipso imo neque in petiolo summo impositis.

PHILIPPINE ISLANDS: Palawan: *Foxworthy 857*, 1906; Puerto Princesa, Mt. Pulgar, *Elmer 12788*, 1911 (TYPE); vicinity of Puerto Princesa, Mt. Tapul, *Liborio Elabalo*, 1940; Tagdaraga, *Alcacid 5961*, 1938.

Croton heterocarpus Muell. Arg. (*C. ardisioides* Hook. f.) appears to reach its easternmost limits of distribution at Banguay Island in British North Borneo (*Castro & Melegrito 1439*), the form there found being identical to the endemic of Malaya (*Griffith 4783*; *Corner 22233*). It bears to *C. palawanensis* a superficial resemblance in the crenate-serrate margin of the leaf, but altogether differs from it in the minute very short-pedicelled to sessile ♀ flowers and all the floral ♀ characters in general. *Croton leiophyllus* Muell. Arg., discussed next, has floral ♀ parts which cannot be distinguished from those of *C. palawanensis* on the material available here, although the lobes of the ♀ perianth are apparently more evolute, inclosing the ovary rather deeply. A character which immediately identifies *C. palawanensis*, not to mention the unique manifestly coriaceous leaf, is the position of the glands; these are set on the lower face of the blade, not at the extremity of the petiole but on the midrib itself, being confluent with the epidermis of the blade. The biotype which this species represents can promptly be identified and appears to be constant in collections made at the same general locality. Since all the species of *Croton* in this group, and of the genus in general, are classified mostly by sums of floral and vegetative characters and intangibles, I see no reason to withhold specific recognition to this plant on the ground that I am not able at this hour to identify it by floral characters. It should be noted that in the vicinity of Puerto Princesa, Palawan, is also found *C. leiophyllus* Muell. Arg., which has altogether different glands and chartaceous rather than coriaceous leaves.

Croton leiophyllus Muell. Arg. in *Linnaea* **34**: 103. 1865, in DC. Prodr. **15**[2]: 573. 1866; Merr. Enum. Phil. Fl. Pl. **2**: 426. 1923.

This species is typified by two Cuming collections, 998 and 1075, duplicates of which I have seen in the herbarium of the Paris Museum, fragments having been taken for our collections with the kind permission of Prof. H. Humbert. According to Merrill (in Phil. Jour. Sci. **30**: 175. 1926), *Cuming* 998 and 1075 were collected in Luzon, the former in the Province of Pangasinan, the latter probably in that of Zambales. *Cuming* 998, which, as seen, has a slightly larger ♀ flower, is fully matched by *Holman* 14, 1910, Luzon, Province of Laguna, Payete, while *Cuming* 1075, the ♀ flower of which is minute, is most close to *Cenabre* 29167, 1923, Palawan, Puerto Princesa. Differences in the size of the ♀ flower in this species do not seem to correspond to local forms and may represent either vegetative or fixed morphological states which will require careful study. A plant from Basilan, *Tacson* 24949 (erroneously distributed as *C. consanguineus*), has the small flower of *Cenabre* 29167, from Palawan, while *Fénix* 15657, from the island of Balabac, which lies between Palawan and Borneo, cannot be distinguished from the plant of Luzon with robust ♀ flowers represented by *Holman* 14. The slender-pedicelled ♀ flowers of *Cenabre* 29167 are suggestive of those of *Barros* 24079, Luzon, Province of Isabela, which is an isotype of *C. leiophyllus* var. *multiflorus* Merr., Enum. Phil. Fl. Pl. **2**: 426. 1923, but are shorter, forming only a transition to the characteristic form of flower of the variety, not as yet falling within its limits. Nothing can be done to study these plants critically with material that, like the specimen available here, has neither ripe capsules nor seeds.

CLAOXYLON A. de Jussieu

Claoxylon subsessiliflorum sp. nov.

Arbuscula ad 3–4 m. alta, innovationibus subherbaceis parcissime setulosis vel glabris. Foliis ellipticis, utrinque acuminatis, 10–15 cm. longis, 2–4 cm. latis, submembranaceis atro-olivaceis subdiscoloribus, sub lente tenuiter papillois glabratis glabrisve, margine obiter repando-serratis, nervis adscendentibus ca. 5–7-jugis gracillimis, alternis, glandulis anticis ad petioli basim valde obscuris vel nullis; petiolo flexuoso, herbaceo, 2–7 cm. longo. Floribus ♂ ignotis. Floribus ♀: cymula laterali (videtur), pauciflora setuloso-puberula ad 2–3 cm. longa, perianthio subsessili vel brevissime pedicellato, setuloso-puberulo, lobis ca. 4, fere ad basim liberis margine integris rotundatis, vix 1 mm. longis totidemque latis, petalis cum lobis (videtur) alternantibus, late quadrangulis, in sicco brunneis, ca. 1.25 mm. latis et 0.75 mm. longis, ovario ovoideo ca. 1.25 mm. magno, setuloso-puberulo, petala evidenter excedente, stylis 3 brevissimis papillois.

INDO-CHINA: Tonkin: Province of Sontay, Mt. Bavi, *Pételot* 2638, 1940 (TYPE); "Arbuste de 3 à 4 mètres en forêt claire."

The characters of the ♀ flower easily separate this new species from all others so far known in the region. Like *Croton*, *Claoxylon* speciates mainly by alterations of the organs of the ♀ perianth, the foliage remaining constant to fairly constant within the same affinity.

OSTODES Blume

Ostodes Katharinae Pax in Pflanzenr. 47[iv. 147. iii]: 19. 1911.

Known so far only from the type-locality in Yunnan. A new record for Indo-China is represented by *Pételot* 6548 and 6567, both collected in Tonkin, Province of Sontay, Mt. Bavi, in light forest at an approximate altitude of 700 m., in May and June 1940 respectively. The large hairy capsule of this species is altogether characteristic.

CHEILOSA Blume

Cheilosa Whiteana sp. nov.

Arbor videtur. Foliis ovatis vel rotundato-ellipticis, brevissime acuminatis, basi cuneato-rotundatis vel cuneatis, 9–12 cm. longis, 6–8 cm. latis, firme chartaceis supra olivaceis subtus ochraceo-brunneis, tenellis adpresse ochraceo-strigulosis, adultis pilis perpaucis in nervorum axillis exceptis glaberrimis, margine valde obiter distanterque repandulo-crenatis, crenis glandulosis, glandulis cicatricosis sessilibus, venis penninerviis curvato-adscendentibus ca. 7-jugis, trabeculis gracilibus, glandulis ad petioli radicem anticis 2 sessilibus obscuris; petiolo canaliculato rigidulo 2–4 cm. longo. Inflorescentiis ♂ ignotis. Inflorescentiis ♀ lateralibus subterminalibusque habitu subspicatis, ut visis ad 5 cm. longis, totis adpresse pallide ochraceo-setulosis, flore squamula triangulari minuta axillato, quove (an abortu tanto ?) singulo, pedicello setuloso ca. 1 cm. longo, perianthio ca. 7 mm. lato, lobis 5 discretis ad 3 mm. longis, 1.5 mm. latis integris, extus setulosis, disco sub ovario continuo vel subcontinuo, 0.5 mm. lato, hic inde pilis adpressis obsito, ovario globuloso-ovoideo toto ochraceo-hispido, ca. 3 mm. magno, stylis 3 vix 1.5 mm. longis apice vix in stigmatibus partitis, semine valde immaturo ca. 1 mm. magno.

PHILIPPINE ISLANDS: Luzon: Province of Pampanga, Mt. Arayat, *Curran* 17733, 1910 (TYPE).

As now constituted, *Cheilosa* includes but two species, *C. montana* Bl., of Java, and *C. homaliiifolia* Merr., of Leyte. This new species abundantly differs from both. It differs from *C. homaliiifolia* in the perianth, styles, and the leaf, which even when young is glabrous in Merrill's species, while it is manifestly setulose in mine. *Cheilosa montana* has an altogether different kind of foliage. The specific name is for Mr. Alain White, senior author of "The Succulent Euphorbieae" to whom I am indebted for the communication of numerous specimens of that tribe.

SAPIUM P. Browne

Sapium plumerioides sp. nov.

Arbor vel arbuscula tota glaberrima. Ramulis ultimis subcarnosulis, cicatricosis, cortice levi rubro-brunneo fere elenticellato. Foliis conferte verticillatis suberectis, ad 10 cm. longis et 4 cm. latis, oblongo-spathulatis ad (vulgo) spathulatis, epidermide coriacea, mesophyllo succulentiore inde nervulis in sicco perspicue minuteque reticulatis, nervis primariis ad 15-jugis gracillimis late patentibus, costa carnosula ad apicem potius recurva quam revera mucronata, lamina a quinto supero in petiolum carnosum abeunte, margine crenulato-serrata glandulosa, hic inde hydatodiis (glandulis crateriformibus) more proprio insignita. Inflorescentiis 2-sexualibus

ad 7 cm. longis, sat crassis, rigidis, spicatis. Floribus ♂ ca. 12, in axilla bracteolae triangularis ad 1.5 mm. latae subintegrae aggregatis, glandulis 2 magnis, perianthio proprio minuscule integro vel subintegro, staminibus ca. 2. Floribus ♀ ignotis: fructu brevissime pedicellato eximie capsulari, ad 0.5 cm. longo latoque, bene trigono, coccis rotundatis.

PHILIPPINE ISLANDS: Babuyan Group: Dalupiri Island, *Bartlett 15167*, 1935 (TYPE).

The type was distributed originally as *Excoecaria* on the strength of its resemblance to material of *E. Kawakamii* Hayata, from Formosa, and I have myself been misled at first to accept it under that genus. However, the disposition of the ♂ flowers, about 12 of which are crowded in the axil of a single bracteole, is definitely the one characteristic of *Sapium*.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED JUNE 30, 1942

It was not anticipated that contributions to the Arnold Arboretum would be as extensive as in previous years, but the total of \$9461.25 is rather impressive when one considers existing economic conditions and the strains brought about by the present war. The receipts for the Gifts for Cultural Purposes Fund amounted to \$3061.25, in spite of the fact that no appeal for assistance was issued during the year. A bibliographic fund amounting to \$2500.00 was received from twenty-three supporters of the Arboretum which enabled us to provide for Dr. Verdoorn's immediate needs. The special travel fund was increased by anonymous gifts amounting to \$535.00, while from the same anonymous donor \$600.00 was received for the George B. Emerson Fellowship III. A grant of \$1200.00 was received from the Committee for Inter-American Artistic and Intellectual Relations to provide for the salary of Dr. Lorenzo R. Parodi during the time he was in the United States. During the year the first awards of the James R. Jewett and the Vieno T. Johnson prizes were made in accordance with the terms of gifts appertaining to the James R. Jewett fund. Also in accordance with the terms of gift the usual amounts were added to principal of the James Arnold and the Charles Sprague Sargent funds. Through the interest of Mr. and Mrs. Arthur G. Rotch of Boston, the Arboretum has received, on loan, an excellent oil painting of James Arnold and family, done in Italy about 1850, and this now graces the main reading room of our library.

The badly overcrowded condition of the herbarium and the overcrowding of certain sections of the library, mentioned in the last annual report, becomes more acute, but under existing conditions it is realized that we shall have to do the best that we can. A certain amount of important material can still be filed in the present herbarium, but any future large distribution is impossible until more floor space and additional steel cabinets can be provided.

Staff. — Through special funds provided for the purpose by numerous friends and supporters of the institution, it was possible to appoint as Bibliographer Dr. Frans Verdoorn, who has initiated work on a large and important project briefly discussed below under bibliography. Dr. F. P. Metcalf was appointed Research Associate for a period of one year to work with me on our accumulated collections from southeastern China. Dr. Lorenzo Parodi of the University of Buenos Aires was appointed Research Associate during the period he was in the United States under the auspices of the Committee for Inter-American Artistic and Intellectual Relations, November 19, 1941 to March 18, 1942. Dr. Charlotte G. Nast was appointed Curator of Wood Collections, and Dr. Hui-Lin Li Technical Assistant. Professor Alfred Rehder and Dr. J. H. Faull, both retired, con-

tinue to work daily on the problems in which they have so long been interested. It is fortunate that our policy is such that a continuation of important research is possible in special cases when retirement, because of the age limit rule, becomes effective. For the first time the Arboretum was assigned the services of four student assistants under the auspices of the National Youth Administration, through whom much important routine work was accomplished.

Instruction. — Various staff members have cooperated with the Division of Biology, through which the Arboretum is affiliated with Harvard University, in offering undergraduate and graduate courses and in supervising graduate students specializing in botany. During the year Dr. Raup gave a course on methods and problems in the study of vegetation, and has outlined a new course that was offered in the summer of 1942 on elementary field botany. Dr. Sax gave a course on cytogenetics, and in association with Dr. Mangelsdorf and Dr. Reed another one on advanced genetics. Dr. Bailey gave an advanced course on the comparative morphology and development of the vascular plants. Under our agreement with the Division of Biology, our staff members may offer a single half-unit course every other year.

The work of the following graduate students was supervised by the staff members indicated: Richard A. Howard by Dr. Johnston; E. Chalmers Smith and George Skirm by Dr. Sax; J. H. Soper and John Brainard by Dr. Raup; Charles Heintzelman and Clyde F. Reed by Dr. Bailey; and Hui-Lin Li and Luetta Chen by myself.

Buildings and grounds. — No changes have been made during the year as far as buildings are concerned; they have been maintained as usual. In the grounds one important change has been made for which we are indebted to Mr. William P. Long, Chairman of the Park Commission. He had excellent, well-designed, new signs prepared and installed at the most used entrance gates to replace the old ones; an important innovation was added, in that the name of each gate is indicated for the benefit of the visiting public. Thus the new gate signs are now coordinated with the direction signs established here and there within the Arboretum. Approximately 2200 new display labels were prepared and of these 800 were placed on the plants, the remainder being reserved for future use.

Now that the detailed planting maps are finished and the identifications of the growing plants checked, much attention has been given to the elimination of unnecessary duplicates as well as certain unsightly species of trees and shrubs that were represented elsewhere in the grounds by good specimens. Special attention was given to the arborvitae and *Chamaecyparis* collection, where 18 plants were removed, and to the general conifer collection, where fifty plants were eliminated, adding much to the attractiveness of this outstanding collection, for many of these had been irreparably damaged by the great hurricane of 1938. Over 100 plants were taken

out of the badly overcrowded Centre Street beds and about 40 from the Bussey Hill plantings. Following the actual checking of named specimens in the already very large collection, some 6500 different species and varieties being involved, new labels with corrected names are being installed as rapidly as possible. The work is very critical and progress is naturally slow. About 350 changes were made during the spring flowering season.

The Hemlock Hill area, badly devastated by the hurricane of 1938, suffered still further in that some sixty old trees left standing after the hurricane died during the early part of 1941. Their death was due to a variety of causes, including great damage to their root systems and twisting of their trunks by the storm, and perhaps to a certain degree by the undue drying out of the terrain following the destruction of the majority of the trees on this once densely forested area. With the assistance of the woods crew of the Harvard Forest, about sixty of these old, dead or moribund trees were felled, and the trunks and branches removed without injury to the now thrifty, well-established young hemlocks that were planted there in 1938-39 and 1939-40 to replace the lost stand of large trees. It is in this one place that the disastrous effects of the great hurricane will be evident for many years to come.

The Centre Street tract presented to the Arboretum by Mr. John S. Ames last year has been placed in a reasonably presentable condition. Unwanted native plants have been eliminated, and many vines and about twenty hybrid crab apples planted. It will take some years to bring this old quarry site into good condition, as, because of the physical condition of the soil and the preponderance of broken rocks, rapid tree growth can scarcely be expected. On the Bussey mansion site a number of hybrid crab apples have been planted, but eventually this area will be worked out as the terminus of the now very large and steadily expanding lilac collection.

Horticulture. — The past winter was mild and as a result there was very little winter killing of flower buds, the net result being one of the most floriferous displays in April and May in the recent history of the Arboretum. During the spring of 1942 one hundred thirty-eight new additions were made to the growing collections by transfer from the nursery. We have at present approximately 2500 different items in the nursery, most of which will be added to the living collections when the plants are large enough to transfer to their permanent places in the grounds.

Because of the great popularity of the lilac collection and the very large number of species and varieties already established, it was decided to make a serious attempt to obtain all the varieties now being grown in America. During the year we acquired 61 additional varieties, bringing our total number of lilac species and varieties to 556. In connection with this project we have cooperated with a group of individuals representing certain botanical gardens and arboreta in a critical examination of the named varieties, which has resulted in the publication of a complete list, with the histories and relative merits of each recognized variety. Now that this lilac study is

completed a similar project has been undertaken on the ornamental crab apples, and a major part of this work will be done at the Arboretum, because of our very large living collections of these attractive plants.

There is naturally very great interest at present in plants of economic value. We have capitalized on this interest to the extent of acquiring thirty additional varieties of nut trees and seventeen varieties of blueberry shrubs. It was thought that it would be highly desirable to establish and maintain these for the benefit of the numerous individuals who seek information regarding them. There is another reason for building up our collection of select economic varieties. Not infrequently, in the past, important forms have been located "in the wild," and these and horticulturally derived varieties not infrequently become lost for one reason or another and drop out of sight. It is desirable that the specialists interested in such finds should realize that the Arnold Arboretum is an excellent place in which important variants may be grown permanently.

The total number of living plants received from various sources in the United States and Canada was 2307. In the same period we received 51 packets of seeds and 187 lots of scions. We distributed 2093 living plants, 257 packets of seeds, and 248 lots of scions. It has become increasingly evident that the Arboretum is financially and physically unable to fulfill all requests that it receives for propagating material representing rare plants. In the past, repeated requests have been received from individuals who obtain material, grow a few plants, dispose of them at high prices, and then make requests for additional propagating material the next year. To obviate certain difficulties inherent in this practice, we now actually propagate and establish extra stock of certain rare plants in our nurseries. This living material is offered to a selected list of cooperating nurserymen, well distributed throughout the United States, who have requested such material, and who agree not to dispose of the living plants that we supply to them, but to utilize these plants as a source of their own propagating material. In this we believe that we are rendering a real service to professional horticulturists, and at the same time we are protecting our own rare species while actually making important items commercially available.

Cytogenetic Laboratory. — The plant breeding work of the past several years has produced a number of promising hybrids. About ten percent of the apple and cherry trees in the experimental nurseries have flowered and among these several are superior ornamental types. Crosses between Oriental and American species of *Malus*, and between diverse species of *Prunus*, have been made possible by utilizing the embryo culture technique. A new type of lilac has been obtained from the progeny of *Syringa persica*. The hybrid *Rosa Harisonii* has produced a variable F_2 population, and several interesting segregates have been obtained. The segregates of *Berberis mentorensis*, a hybrid between the evergreen *B. Julianae* and *B. Thunbergii*, include some evergreen plants with intermediate leaf types. The cytological work has dealt with the effect of X-rays on chromosome

structure, and differential sensitivity of various parts of seeds and young plants. This work was aided by a grant from the International Cancer Research Foundation.

Wood Anatomy. — Professor Bailey and Dr. Nast have devoted considerable attention to the problems of determining the affinities of herbarium specimens that cannot be assigned with certainty to specific families by an examination of their external morphology. This type of work necessitates intensive investigations of the internal structure of all parts of an herbarium specimen, viz. stem, node, petiole, leaf, and floral organs if available. In addition, it is essential to have extensive collections of anatomical preparations in the form of slides for comparative purposes. Such slides are of course indispensable in any fundamental investigation of the phylogeny and relationships of the various families of the angiosperms.

Considerable progress has been made during the last year in expanding the collection of slides of dicotyledonous woods to include anatomical preparations from herbarium specimens. Special emphasis was placed upon developing a reference collection of pollen slides, since such a collection should ultimately be of much utility not only to taxonomists, paleobotanists and morphologists, but also to those concerned in the analysis of peat and other organic deposits and in the study of hay fever. Through the assistance of Dr. Clyde F. Reed and of various graduate students, between 3000 and 4000 permanent pollen mounts, representing approximately 1800 genera in 160 families of the angiosperms, were added to the slide collection. To the collection of microscopic slides of wood sections 382 were added, bringing the total to 24,764, representing 7183 species. The wood collection was also increased from 5278 to 5569 species, the totals in the collections now being 9426 individual collections (preserved specimens) and 12,402 individual collections (dried specimens).

Several cooperative investigations have been undertaken both within and without the University. Professor Bailey and Dr. Smith are attempting to correlate taxonomic and anatomical data in the study of the relationships of various families of the Ranales. Dr. Nast is cooperating with Messrs. Krukoff and Gilly of the New York Botanical Garden in an intensive study of the Sapotaceae. Professor Bailey and Dr. Barghoorn, working in collaboration with Mr. Frederick Johnson of the Peabody Foundation for Archaeology, prepared a report upon the stakes and wattles of the Boylston Street Fishweir. Professor Bailey has also cooperated with Dr. Earl E. Berkley of the United States Department of Agriculture in the interpretation of physical data obtained by X-raying coniferous and dicotyledonous woods.

Plant Pathology. — Official work in this field largely ceased with the retirement of Dr. Faull. To meet a critical situation in genetics, provision had to be made to take care of that problem, and we were unfortunately obliged to cancel a proposed appointment in plant pathology. Dr. Faull,

however, continues to occupy his laboratory and is prosecuting investigations in his special field. He courteously takes care of our special problems as they arise, even although he at times has to sacrifice his own personal interests.

The Herbarium. — During the year a total of 24,575 specimens was mounted, of which 23,101 were inserted into the herbarium, the remainder being herbaceous plants. In order to facilitate the keeping of records, it was decided to treat the mounted specimens which are under study or which, because of lack of space, cannot be inserted into the general collection at present as actually a part of the herbarium. In this category are 55,275 previously mounted specimens, largely Chinese and New Guinean plants still being studied by staff members. The addition of these plants to the herbarium total, together with specimens mounted and inserted this year, brings the total number of specimens in the herbarium to 592,256.

The number of specimens received by exchange, gift, subsidy, purchase, or for identification was 46,709. This number may be broken down geographically as follows: from North and South America, 25,212; from Papuasia, 7,359; from Polynesia, 6,860; from Indo-China, India, and Malaysia, 5,534; from Australia, 786; from the Philippines, China, Japan, and Africa, 958. The largest American collection received was a set of 5,432 specimens from the Universidad Nacional de Tucuman, Argentina; other important collections were about 6,000 specimens (including duplicates) collected in Fiji by Otto Degener (the concluding shipment of material obtained during the 1940–41 cruise of the "Cheng Ho," sponsored by Mrs. Anne Archbold), 6088 specimens received in exchange from the Botanic Garden at Buitenzorg, Java, 1271 specimens collected in New Guinea by M. S. Clemens, and 1629 specimens purchased from the Boston Museum of Natural History, this last item including important historical material from Java and India collected by Zollinger and Wight.

The Arnold Arboretum distributed to other institutions a total of 19,412 duplicates, practically all of which went to American institutions; 17,627 of these specimens were sent as exchange, the remainder for identification by specialists. To the Gray Herbarium 11,075 specimens and 222 illustrations were transferred, to the Farlow Herbarium 271 specimens, and to the Ames Orchid Herbarium at the Botanical Museum 973 specimens. Books and microfilm to the equivalent value of 8,355 specimens were distributed under a special exchange arrangement. Thus the total number of specimens or their equivalent sent out was 27,989. A great quantity of material has been set aside for shipment to European herbaria when possible.

Forty-one loans, with a total of 4,087 specimens, were sent out for study by specialists in 18 American institutions. For study by our own staff members, 106 loans consisting of 7,288 specimens were borrowed from 23 institutions.

The card catalogue of references to new species and other important literature in the field of the taxonomy of woody plants now totals 131,695

cards, having been increased by 2,576 cards during the year. The collection of negatives representing types and other critical specimens was increased by 91 and now contains 4,138 negatives.

Routine work in the herbarium has been greatly handicapped by the fact that expansion space is at an end; no further distribution of specimens into the herbarium, except for small and especially needed groups, will be possible until additional floor space and cases are available. As a makeshift arrangement newly mounted specimens are being filed in generic order in cardboard cases on top of the steel cases in the Conifer Room, thus making consultation of the new material in each family possible, although very inconvenient. Due to war conditions, incoming material has been substantially less than in recent years, and this has permitted the mounting of many older collections which had been set aside in favor of more recent and more urgently needed collections. However, a vast amount of unmounted material still awaits attention. During the year we have continued to incorporate clippings, typed descriptions, and illustrations into the herbarium, and the work of breaking down the large genera into geographic series has been essentially completed.

Staff members continued to work in their special fields, in addition to carrying out routine work of identification. Numerous papers were prepared for publication, as indicated by the bibliography appended to this report. Professor Rehder made substantial progress with the bibliographical supplement to his Manual of Cultivated Trees and Shrubs. Dr. Smith completed his study of the Fijian collection made by Otto Degener and prepared a report for publication, also continuing his work on certain Papuan families and undertaking, in collaboration with Professor Bailey, a study of the woody Ranales. Dr. Johnston has worked almost exclusively on the flora of the plateau region in northern Mexico, including a critical study of his own collections and those prepared by Mr. Robert Stewart. While his own and the Stewart collections were being mounted preparatory to study, he named and reported on three large collections from western Texas and northern Mexico. He has commenced work on his catalogue of the flora of Coahuila and eastern Chihuahua. His work has been greatly facilitated through the acquisition of important collections from contiguous areas. Dr. Raup has prosecuted some special field work in New England, but has devoted most of his time to a study of collections made by himself and others in northern Canada. He has reported on approximately 1000 numbers sent to him by correspondents for identification. Two new projects have been developed, one preparing detailed range maps showing the Canadian, Alaskan and northern United States distribution of the Mackenzie Mountains species; the other on trends in the development of geographic botany. Dr. Kobuski has prepared regional studies of certain genera of Theaceae in America and is continuing his studies of this family. Mr. Palmer, in addition to extending his collections of cultivated plants in the Arboretum, has given special attention to the genera *Quercus* and *Crataegus*. Dr. Allen has continued her work on the Lauraceae of eastern Asia, has

completed a study of this family in Papuasia, and is undertaking preliminary work on the American representatives. Dr. Perry has devoted most of her time to continued study of the extensive Papuan material collected by the Archbold Expeditions, Mrs. Clemens, and other collectors. Dr. Croizat has extended his work on the Euphorbiaceae and has undertaken studies of certain groups in the Cactaceae. Dr. Li completed his monographic study of the Chinese Araliaceae and began identification work in selected families of the large Chinese collections received by the Arboretum in recent years. Miss Luetta Chen has completed her work on the genus *Sabia*. Dr. F. P. Metcalf of Lingnan University, who had spent the previous year at the Arboretum on the basis of a Guggenheim Foundation Fellowship, was appointed Research Associate for the year 1941–42, to work with me on the basis of a Milton Fund grant on our accumulated collections of Chinese material. He resigned to accept a commission in the Army Intelligence Service on April 15. My own work has been largely on various problems appertaining to the floras of China, Indo-China, the Philippines, New Guinea and the Solomon Islands, on Polynesian bibliographic problems, and towards the end of the year the initiation of a very extensive investigation of the botanical problems raised by the erratic work of Rafinesque between the years 1804 and 1840. This will involve a searching examination of all the numerous botanical papers that he published, many of them exceedingly rare, the preparation of a very extensive card index, and the eventual preparation of an Index Rafinesquianum in which it is proposed to list all of his thousands of new generic and specific names; a preliminary estimate seems to show that this will result in the probable addition in excess of 1200 entries to Index Kewensis. Because of the homonym rule it is highly desirable that all these legitimately published names be listed, for over 100 years has elapsed since they were published. This is one of the very few places in which such a task could be consummated, for fortunately the library of the Arnold Arboretum contains an almost complete set of Rafinesque's very numerous publications on botany.

Field work. — Because of war conditions, all of our cooperative field work has ceased in China, Siam, Burma, India, and Philippines, and Malaysia. We have been able to accomplish some important work in Cuba, operating through the Atkins Institution by employing a Cuban collector who had served two seasons as an assistant to Dr. Richard A. Howard. A similar attempt in Mexico was reasonably successful, but after a fair trial was discontinued. We were able to finance an assistant to Dr. Richard Schultes, Mr. C. Earle Smith, for several months' field work in Colombia, but critical shipping conditions have as yet not made the delivery of the Cuban or the Colombian collections possible; the material prepared is however in safe storage in Cienfuegos and Bogotá. A modest grant was made to the Instituto Miguel Lillo at Tucuman to finance an exploration of a little known area in northern Argentina. Dr. Johnston, partly financed by the Carnegie Institution, spent ten weeks beginning August 1, 1941

prosecuting field work in Coahuila and Chihuahua, Mexico, in the cooperative project between the Arboretum and the Carnegie Institution, involving an ecological and systematic survey of the Mexican desert floras. His season was particularly successful, as it was considered to be the wettest one in about twenty-five years. The vegetation naturally responded to the unusual precipitation, and what is even better, he was able to visit remote areas that in normal years are closed to travel because of the scarcity and uncertainty of the water supply. Regions previously unvisited by any botanist were explored. He collected about 2000 numbers represented by approximately 10,000 specimens. Dr. Johnston, on his previous trip to this region, interested Mr. Robert Stewart, a local resident, in botanical field work, and through modest grants made to him from Arboretum funds to cover the expenses of field work, we have acquired approximately 1800 numbers with ample duplicates from this same general region. Some local field work in New England was prosecuted by Dr. Raup and Mr. Palmer.

Bibliography. — Dr. Verdoorn has made excellent progress on his major project initiated at the beginning of the year. This is projected as an "Index Botanicorum" or a biographical dictionary of plant scientists. A standard printed form, to be filed for reference, has been prepared for each entry, and to these forms a great mass of data appertaining to individual botanists is being transferred from a variety of sources. The files at present contain about 20,000 names and it is believed that ultimately this may be increased to about 50,000. This task is projected to cover the subject for the entire world from the earliest times to the present. Supplementary to this project he is also compiling corresponding data on the history of botanical gardens. He has found the library of the Arnold Arboretum to be a unique source of published work needed for consultation in connection with researches on botanical history.

The Library. — During the past fiscal year accessions to the library amounted to 310 bound volumes, 226 pamphlets, 188 photographs and 105 negatives, and approximately 100 nursery catalogues. The total number of bound volumes is now 45,122, of pamphlets 13,183, and of photographs 18,850. Mrs. Susan Delano McKelvey made a generous gift of 156 photographs and 105 negatives. Some 1,720 cards were added to the main catalogue, 1,216 of them containing bibliographical data, and 427 slips were added to the subject catalogue which continues the printed subject catalogue of the library. Many books have been sent out on inter-library loan, most of them to other departments of the University, while numerous volumes have been borrowed for use here. The number of periodicals received by exchange and subscription was materially reduced because of mailing conditions. Requests for microfilms and photostats continued to be numerous. A list of duplicates has been widely distributed to libraries and universities in this country, and most of the important items have been sold.

Atkins Institution of the Arnold Arboretum, Soledad, Cienfuegos, Cuba. — This unit now operates under its own charter, having been registered with the local provincial authorities as a non-profit scientific institution at the beginning of the fiscal year. The net results have been satisfactory, as certain restrictions imposed through industrial and commercial laws are eliminated. In the garden itself the activities have been largely of a routine nature, but additional plantings have been made in the palm section and in the succulent garden, and the native woodland section has been further improved by eliminations of some of the more rapidly growing trees that overshadowed more desirable and slower growing hardwood species. Arrangements have been made to establish a variety nursery for Pará rubber selections (*Hevea brasiliensis*) in cooperation with the United States Department of Agriculture, the objective being to provide a place from which disease free bud-wood may be secured for plantation developments elsewhere in tropical America. The garden nursery has also been increased in size to take care of accessions awaiting transfer to their permanent sites. The construction of the extensions to the greenhouse and lath house, and the completion of the connecting shelter house for visitors, provided for through an anonymous gift in the preceding year, was consummated. Casual visitors have been fewer, but among those who registered at Harvard House and took advantage of the facilities there available were Mr. Fred H. Howard, interested in certain sugarcane problems, Dr. Falconer Smith, to study ants, Dr. D. Eugene Copeland, interested in frogs, Dr. Hugh C. Cutler in connection with a study of maize varieties of tropical America, Dr. Richard A. Howard for field work in botany, Dr. C. V. Morton for field work in botany, Major Chapman Grant, interested in lizards, Dr. A. S. Forster, on a Guggenheim Foundation Fellowship to study cycads, Dr. Marie Victorin and Brother Léon, in connection with their investigations of the Cuban flora. The summer rains were normal, but the autumn precipitation was light. The total rainfall for the year was 46.29 inches. The publication of the Frère Marie Victorin-Frère Léon "Itinéraires botaniques dans l'île de Cuba" by the University of Montreal in the early part of 1942 was made possible by generous donations through the Atkins Institution to the University of Montreal, from Mrs. Atkins and Dr. Barbour, an excellent illustration of inter-institutional and international cooperation. One hundred eighty packets of seed, 147 plants, and 113 cuttings were distributed, and 241 packets of seeds and 160 plants were received.

Publications. — The two regular serials, the technical Journal of the Arnold Arboretum and the popular Arnoldia (a continuation of the Bulletin of Popular Information), have been maintained at their usual standard of excellence. No special publications were issued during the year. Plans have been perfected to discontinue the Contributions from the Arnold Arboretum, the last number of which was issued in 1938, and to replace it by a somewhat more economical format under the title of Sargentia. This will be issued at irregular intervals and will provide a place for the publi-

cation of important technical papers by staff members that are too long for Journal articles. The name selected commemorates Dr. Charles Sprague Sargent, who organized the Arnold Arboretum and served as its director for the first fifty-five years of its existence. A bibliography of the published writings of staff members and of students working under the supervision of staff members follows.

Bibliography of the Published Writings of the Staff and Students July 1, 1941 — June 30, 1942

- ALLEN, C. K. Gentianaceae. In Woodson, R. E., Jr. & Schery, R. W. Contributions toward a flora of Panama, V. Ann. Missouri Bot. Gard. **28**: 459-460. 1941.
- Lauraceae. In Merrill, E. D. The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39. Brittonia **4**: 56-63. 1941.
- Studies in the Lauraceae, IV. Preliminary study of the Papuan species collected by the Archbold expeditions. Jour. Arnold Arb. **23**: 112-155. 1942.
- ASMOUS, V. C. Jubilee of the Society of Naturalists of Moscow. Chron. Bot. **6**: 422-423. 1941.
- P. S. Pallas, a great Russian naturalist, 1741-1811. Rossiya **9**(2210): 3. 1941 (In Russian).
- P. S. Pallas as a botanist and explorer, 1741-1811. Chron. Bot. **7**: 14. 1942.
- Russian discoveries in the Pacific Ocean. Rossiya **10**(2372): 3-4. 1942 (In Russian).
- BAILEY, I. W. & BARGHOORN, E. S., JR. Identification and physical condition of the stakes and wattles from the Fishweir. In Johnson, F. The Boylston Street Fishweir. Peabody Foundation for Archeology. Andover. 82-89, 4 *pl.* 1942.
- & BERKLEY, E. E. The significance of x-rays in studying the orientation of cellulose in the secondary wall of tracheids. Am. Jour. Bot. **29**: 231-241, 18 *fig.* 1942.
- & HOWARD, R. A. The comparative morphology of the Icacinaceae, III. Imperforate tracheary elements and xylem parenchyma. Jour. Arnold Arb. **22**: 432-442, 3 *pl.* 1941.
- & HOWARD, R. A. The comparative morphology of the Icacinaceae, IV. Rays of the secondary xylem. Jour. Arnold Arb. **22**: 556-568, 4 *pl.* 1941.
- CROIZAT, L. The "Cactaceae" of W. T. Marshall and T. B. Bock: a review. Desert **14**: 77-78. 1942.
- On certain Euphorbiaceae from the tropical Far East. Jour. Arnold Arb. **23**: 29-54. 1942.
- Confusion in Viburnums. Am. Nurseryman **74**(11): 5-7, 1 *fig.* 1941.
- Echinofossulocactus or Stenocactus. Cactus & Succ. Jour. **14**: 69-71, 1 *fig.* 1942.
- Euphorbiaceae. In Merrill, E. D. The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39. Brittonia **4**: 96-98. 1941.
- Euphorbiaceae and Sapindaceae. In Moldenke, H. N. The flora of extra-tropical South America, II. Lilloa **6**: 298-304. 1941.
- Identifying maples in winter. Am. Nurseryman **75**(3): 5-6, 2 *fig.*, (4): 13-14, 6 *fig.* 1942.
- Identifying trees in winter. Am. Nurseryman **75**(6): 5-6, 2 *fig.* 1942.
- Kalanchoe Gossweileri sp. nov. from Portuguese Africa. Desert **14**: 25-27, 1 *fig.* 1942.
- Kleinia pendula, the inch-worm. Desert **13**: 185-188, 3 *fig.* 1941.
- Mammillaria Nellieae comb. nov. Cactus & Succ. Jour. **14**: 34. 1942.

- On methods and experiments. *Cactus & Succ. Jour.* **13**: 184-185. 1941.
- New and critical Euphorbiaceae chiefly from the southeastern United States. *Bull. Torrey Bot. Club* **69**: 445-460, 2 *fig.* 1942.
- New species of *Croton* from Guatemala. *Field Mus. Nat. Hist. Bot. Ser.* **22**: 445-453. 1942.
- Notes on the Euphorbiaceae, II. *Bull. Jard. Bot. Buitenzorg III.* **17**: 204-208. 1941.
- Peculiarities of the inflorescence in the Euphorbiaceae. *Bot. Gaz.* **103**: 771-779, 14 *fig.* 1942.
- *Phyllanthus nummulariaefolius* Poir. in the United States. *Torreya* **42**: 14-17. 1942.
- Preliminaries for the study of Argentine and Uruguayan species of *Croton*. *Darwiniana* **5**: 417-462. 1941.
- A study of *Manihot* in North America. *Jour. Arnold Arb.* **23**: 216-225, 1 *fig.* 1942.
- The succulent Euphorbiaceae, a review. *Desert* **13**: 193-194. 1941.
- The tribe Plukenetiae of the Euphorbiaceae in eastern tropical Asia. *Jour. Arnold Arb.* **22**: 417-431. 1941.
- HEIMSCH, C., JR. Comparative anatomy of the secondary xylem in the "Gruinales" and "Terebinthales" of Wettstein with reference to taxonomic groupings. *Lilloa* **8**: 83-198, 17 *pl.* 1942.
- JOHNSTON, I. M. Bibliographic data concerning Gay's *Flora de Chile*. *Darwiniana* **5**: 154-165. 1941.
- Boraginaceae. In Kearney, T. H. & Peebles, R. H. *Flowering plants and ferns of Arizona*. Washington. 740-761. 1942.
- KOBUSKI, C. E. Theaceae and Oleaceae. In Merrill, E. D. *The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39*. *Brittonia* **4**: 114-121, 165-168. 1941.
- Studies in the Theaceae, VII. The American species of the genus *Cleyera*. *Jour. Arnold Arb.* **22**: 395-416. 1941.
- Studies in the Theaceae, VIII. A synopsis of the genus *Freziera*. *Jour. Arnold Arb.* **22**: 457-496. 1941.
- Studies in the Theaceae, XI. *Killipiodendron*. *Jour. Arnold Arb.* **23**: 231-232. 1942.
- MANGELSDORF, P. C. The expanding literature on maize. *Jour. Hered.* **32**: 186. 1941.
- The origin of maize. *Proc. Eighth Amer. Sci. Congr.* **3**: 267-274. 1942.
- & ATKINS, I. M. The isolation of isogenic lines as a means of measuring the effects of awns and other characters in small grains. *Jour. Amer. Soc. Agron.* **34**: 667-668. 1942.
- MERRILL, E. D. Man's influence on the vegetation of Polynesia, with special reference to introduced species. *Proceed. Sixth Pacific Sci. Cong.* **4**: 629-639. 1941.
- A new species of *Premna* from the Philippines. *Phytologia* **2**: 5-6. 1941.
- A note on the dates of issue of the fascicles comprising Cosson's "*Illustrationes florum Atlanticae*," 1882-1897. *Jour. Arnold Arb.* **22**: 455-456. 1941.
- Records of Indo-Chinese plants, III. *Jour. Arnold Arb.* **23**: 156-197. 1942.
- The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39. *Brittonia* **4**: 20-188, 3 *fig.* 1941.
- & METCALF, F. P. *Hedyotis* Linnaeus versus *Oldenlandia* Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance. *Jour. Arnold Arb.* **23**: 226-230, 1 *pl.* 1942.
- & PERRY, L. M. Myrtaceae. In Merrill, E. D. *The Upper Burma plants collected by Captain F. Kingdon Ward on the Vernay-Cutting expedition, 1938-39*. *Brittonia* **4**: 125-127. 1941.
- & PERRY, L. M. Observations on the Old World species of *Turpinia* Ventenat. *Jour. Arnold Arb.* **22**: 543-555. 1941.

- & PERRY, L. M. *Plantae papuanae Archboldianae*. VII, VIII, IX. Jour. Arnold Arb. **22**: 375-388, 529-542. 1941; **23**: 233-265. 1942.
- & PERRY, L. M. A summary of *Kentrochrosia* Lauterbach and Schumann. Philippine Jour. Sci. **76**: 19-21. 1941.
- METCALF, F. P. *Flora of Fukien*. Fasc. 1. Lingnan University. i-xviii, 1-82, 2 maps. 1942.
- Flowers of the Chinese New Year. *Arnoldia* **2**: 1-8, 3 *pl.* 1942.
- Relationships between Chinese and Indian *Berchemia*. Peking Nat. Hist. Bull. **16**: 17-28, map. 1941.
- MURRILL, W. A. & PALMER, E. J. A new willow from Florida. Jour. Arnold Arb. **22**: 580-581, 1 *fig.* 1941.
- PALMER, E. J. *Panicum recognitum* in Rhode Island. *Rhodora* **44**: 227. 1942.
- The red oak complex in the United States. *Am. Midl. Nat.* **27**: 732-740, 2 maps. 1942.
- RAUP, H. M. Additions to a catalogue of the vascular plants of the Peace and Upper Liard River regions. Jour. Arnold Arb. **23**: 1-28. 1942.
- REHDER, A. New species, varieties and combinations from the collections of the Arnold Arboretum. Jour. Arnold Arb. **22**: 569-579. 1941.
- SAX, K. The behavior of x-ray induced chromosomal aberrations in *Allium* root tip cells. *Genetics* **26**: 418-425. 1941.
- The distribution of x-ray induced chromosomal aberrations. *Proceed. Nat. Acad. Sci.* **28**: 229-233. 1942.
- The mechanisms of x-ray effects on cells. *Jour. Gen. Physiol.* **25**: 533-537. 1942.
- Types and frequencies of chromosomal aberrations induced by x-rays. Cold Spring Harbor Symp. Quant. Biol. **9**: 93-101, 12 *fig.* 1941.
- SMITH, A. C. *Araliaceae* and *Vacciniaceae*. In Woodson, R. E., Jr. & Schery, R. W. Contributions towards a flora of Panama, V. *Ann. Missouri Bot. Gard.* **28**: 437-452. 1941.
- A new frailejone from Venezuela. *Bol. Soc. Venez. Cienc. Nat.* **7**: 237-238. 1942.
- Studies of Papuan plants, III, IV. Jour. Arnold Arb. **22**: 343-374, 497-528. 1941.
- The vegetation of the Guianas, a brief review. *Chron. Bot.* **6**: 449-452, 1 *fig.* 1941.
- & BAILEY, I. W. *Brassiantha*, a new genus of Hippocrateaceae from New Guinea. Jour. Arnold Arb. **22**: 389-394, 1 *pl.* 1941.
- SMITH, E. C. & NICHOLS, C., JR. Species hybrids in forest trees. Jour. Arnold Arb. **22**: 443-454. 1941.
- VERDOORN, F. Plant science institutions, stations, museums, gardens, societies, and commissions in Central and South America. *Chron. Bot.* **7**: 49-61. 1942.
- The future of our large institutions of systematic botany. *Chron. Bot.* **7**: 61-64. 1942.
- A list of plant scientists in Central and South America. *Chron. Bot.* **7**: 97-133. 1942.
- WERSHING, H. F. & BAILEY, I. W. Seedlings as experimental material in the study of "redwood" in conifers. *Jour. Forest.* **40**: 411-414. 1942.
- WYMAN, D. Elms grown in America. *Arnoldia* **1**: 65-80, 4 *pl.* 1941.
- The highbush blueberry. *Arnoldia* **2**: 29-32. 1942.
- Nursery sources for nut trees. *Arnoldia* **2**: 9-12. 1942.
- The one hundred "best" lilacs. *Arnoldia* **2**: 33-36. 1942.
- The order of bloom of trees and shrubs. In Wright, R. and others. *Gardening with the experts*. New York. pp. 189-212. 1941.

**Staff of the Arnold Arboretum,
1941-42**

ELMER DREW MERRILL, S.D., LL.D., Arnold Professor of Botany and Director.

JOHN GEORGE JACK, Assistant Professor of Dendrology, Emeritus.

ALFRED REHDER, A.M., Associate Professor of Dendrology and Curator of the Herbarium, Emeritus.

JOSEPH HORACE FAULL, Ph.D., Professor of Forest Pathology, Emeritus.

IRVING WIDMER BAILEY, S.D., Professor of Plant Anatomy.

KARL SAX, Ph.D., Professor of Cytology.

PAUL CHRISTOPH MANGELSDORF, S.D., Professor of Botany.

ALBERT CHARLES SMITH, Ph.D., Curator of the Herbarium.

IVAN MURRAY JOHNSTON, Ph.D., Associate Professor of Botany.

HUGH MILLER RAUP, Ph.D., Assistant Professor of Plant Ecology.

CLARENCE EMMEREN KOBUSKI, Ph.D., Assistant Curator of the Herbarium.

DONALD WYMAN, Ph.D., Horticulturist.

ERNEST JESSE PALMER, Collector and Research Assistant.

CAROLINE KATHRYN ALLEN, Ph.D., Assistant in the Herbarium.

LILY MAY PERRY, Ph.D., Technical Assistant.

LEON CROIZAT, J.D., Technical Assistant.

FRANS VERDOORN, Ph.D., Bibliographer.

FRANKLIN POST METCALF, Ph.D., Research Associate.

LORENZO RAIMONDO PARODI, Ph.D., Research Associate.

CHARLOTTE GEORGIA NAST, Ph.D., Curator of Wood Collections.

HUI-LIN LI, Ph.D., Technical Assistant.

JANET RYTHER SELLARS, A.B., Librarian.

VLADIMIR CONSTANTIN ASMOUS, A.B., Assistant Librarian.

SUSAN DELANO MCKELVEY, A.B., Research Assistant.

CONSTANCE MANSFIELD GILMAN, Business Secretary.

LOUIS VICTOR SCHMITT, Superintendent.

WILLIAM HENRY JUDD, Propagator.

INDEX

Synonyms are printed in *italics*; new names in **bold-face** type.

- Abies balsamea*, 8
Acacia aulacocarpa macrocarpa, 395
 — *crassicarpa*, 395
 — *leptocarpa*, 395
 — *Mangium*, 395
 — *pennata*, 396
Acer Negundo, 21
Achillea Ptarmica, 26
Achyranthes amaranthoides, 385
Acmena acuminatissima, 247
 — *hemilampra*, 248
 — *laevifolia*, 248
 — *polyantha*, 247
Actephila dolichantha, 30
 — *inopinata*, 29
 — *longipedicellata*, 29
 — **Merrilliana**, 29
Actinodaphne Archboldiana, 117
 — **Brassii**, 116
 — **solomonensis**, 117
 — *tomentosa*, 116
 Additions to a catalogue of the vascular plants of the Peace and Upper Liard River regions, 1
Adenanthera falcata, 395
 — *microsperma*, 396
Adenochlaena § *Symphyllia*, 53
 — *indica*, 53
 — *silhetiana*, 53
Aganosma grandiflora, 190
Agastache Foeniculum, 23
Agonis lysicephala, 87
Agrimonia striata, 20
Agropyron dasystachyum subvillosum, 10
 — *repens*, 10
 — — *subulatum*, 10
 — *riparium*, 10
 — *Smithii*, 10
 — *trachycaulum glaucum*, 10
 — — *novae-angliae*, 10
Agrostis scabra, 11
 — *stolonifera*, 11
Albizzia falcata, 395
 — *lebbekioides*, 395
 — *littoralis*, 394
 — *minahassae*, 393
 — *moluccana*, 395
 — *retusa*, 394
Alchornea androgyna, 47
 ALLEN, CAROLINE K. Studies in the Lauraceae, IV. Preliminary study of the Papuan species collected by the Archbold Expeditions, 112
 — Studies in the Lauraceae, V. Some eastern Asiatic species of *Beilschmiedia* and related genera, 444
Alopecurus aequalis, 11
Alsomitra integrifoliola, 196
 — *tonkinensis*, 196
Amaranthus graecizans, 15
 — *retroflexus*, 15
Ambrosia artemisiifolia, 26
 — *trifida*, 26
Anamtia stolonifera, 355
Anemone canadensis, 16
Anethum graveolens, 22
Antennaria aprica, 26
 — *atriceps*, 26
Anthemis Cotula, 26
 — *tinctoria*, 26
Apios carnea, 169
Apocynum alterniflorum, 191
Apodytes cambodiana, 66, 73
Arabis divaricarpa, 19
 — *hirsuta pycnocarpa*, 18
 — *Holboellii*, 18
 — — *retrofracta*, 18
 — *lyrata kamchatica*, 18
Aralia pseudo-ginseng, 187
Arceuthobium americanum, 14
Archboldianae, IX, X, *Plantae Papuanae*, 233, 383
Archidendron gawadense, 392
 — *Ledermanii*, 392
 — **megaphyllum**, 392
 — **molle**, 393
 — **papuanum**, 392
 — *Schlechteri*, 391
Arctostaphylos Uva-ursi, 23
Ardisia albiflora, 345
 — **austroasiatica**, 347
 — *crassinervosa*, 348
 — *crispa angusta*, 348
 — *crispipila*, 345
 — *depressa*, 346
 — *elegans*, 349
 — *evonymifolia*, 353
 — *floribunda*, 347

- Ardisia gigantifolia*, 354
 — *Helferiana*, 345
 — — *septentrionalis*, 345
 — — *humilis obovata*, 345
 — *kteniophylla*, 354
 — *kwangtungensis*, 349
 — *Merrillii*, 351
 — *micrantha*, 346
 — *oxyphylla cochinchinensis*, 345
 — *pedalis*, 351
 — *quinquegona*, 346
 — — *hainanensis*, 347
 — — *micranthera*, 346
 — — *oblonga*, 346
 — *solanacea*, 345
 — *stellifera*, 353
 — *Thorelii*, 349
 — *tonkinensis*, 353
 — *Tsangii*, 353
 — *villosoides*, 353
 — *virens*, 353
 — — *annamensis*, 353
 — *yunnanensis*, 348
 — *yunnanensis*, 347
Arenaria dawsonensis, 16
Aristolochia gracilifolia, 383
 — *megalophylla*, 384
 — *tagala*, 384
Armoracia lapathifolia, 18
Arnica obtusifolia acuta, 27
 Arnold Arboretum, 1941-42, Staff of the, 522
 Arnold Arboretum during the fiscal year ended June 30, 1942, The, 509
Artabotrys Petelotii, 162
Artemisia Abrotanum, 27
 — *Absinthium*, 27
 — *arctica*, 27
 — *biennis*, 27
 — *borealis*, 26
 — *caudata*, 26
 — *dracunculoides*, 26
 — *ludoviciana*, 27
Aruncus sylvester, 19
Arundarbor remotiflora, 101
Asarum glabrum, 160
 — *reticulatum*, 161
Asparagus officinalis, 13
Aster angustus, 25
 — *sibiricus*, 25
Astragalus canadensis, 20
 — *lineare*, 20
Atriplex hortensis, 15
 — *patula hastata*, 15
Avena Hookeri, 11
 — *sativa*, 11
Axyris amaranthoides, 15
Baeckea frutescens, 89
 BAILEY, I. W. & A. C. SMITH. Degen-
 eriaceae, a new family of flowering
 plants from Fiji, 356
Balanophora papuana, 383
Bambusa aurinuda, 95
 — *cerosissima*, 101
 — *gibba*, 101
 — *remotiflora*, 101
 — *Tsangii*, 97
Barbarea orthoceras, 18
Barclaya Motleyi, 390
Basisperma, 84
 — *lanceolata*, 84
Bauhinia bracteata, 170
 — *carcinophylla*, 171
 — *caterviiflora*, 170
 — *Clemensiorum*, 171
 — *coccinea*, 170
 — *Harmandiana*, 170
 — *melanophylla*, 172
 — *monandra*, 399
 — *Schlechteri*, 399
 — *tenuiflora*, 170
 — *unguiculata*, 170
Beilschmiedia and related genera, Studies
 in the Lauraceae, V. Some eastern
 Asiatic species of, 444
Beilschmiedia Archboldiana, 130
 — *atrata*, 451
 — *Brassii*, 130
 — *brevipaniculata*, 446
 — *bullata*, 131
 Cairocan, 445
 — *discolor*, 448
 — *erythrophloia*, 447
 Fordii, 445
 grandiosa, 449
 — *intermedia*, 448
 — *laevis*, 446
 longepetiolata, 450
 — *macropoda*, 452
 — *obconica*, 453
 percoriacea, 450
 — *pergamentacea*, 449
 — *robusta*, 447
 — *Roxburghiana*, 451
 — *spec.*, 445
 — *Tsangii*, 453
 — *Wangii*, 452
 yunnanensis, 447
Belliolum Burtianum, 439
 — *gracile*, 439
 — *haplopus*, 438
 — *Kajewskii*, 440
Betula papyrifera neoalaskana, 14

Bibliography of the published writings of the staff and students July 1, 1941-June 30, 1942, 519

Bladhia pseudoquinquegona, 346

Bonpland's "Description des plantes rares cultivées à Malmaison et à Navarre," 110

Botrychium matricariaefolium, 8

— *multifidum*, 8

— *ternatum rutaefolium*, 8

Brassica arvensis, 17

— *campestris*, 17

— *Kaber pinnatifida*, 17

Brassiodendron, 153

— *fragrans*, 153

Braya purpurascens, 18

— *Richardsonii*, 18

Bromus inermis, 9

— *Porteri*, 9

— *secalinus*, 9

Bubbia amplexicaulis, 438

— *Archboldiana*, 433

— *argentea*, 436

— *auriculata*, 438

— *bullata*, 426

— *calophylla*, 436

— *calothyrsa*, 427

— *Clemensiae*, 431

— *glauca*, 433

— *haplopus*, 438

— *idenburgensis*, 432

— *longifolia*, 429

— *megacarpa*, 434

— *monocarpa*, 428

— *montana*, 426

— *pachyantha*, 428

— *sororia*, 427

— *sylvestris*, 430

Buxus pubifolia, 174

Calamagrostis canadensis, 11

— — *robusta*, 11

— *neglecta*, 11

Callicarpa heterotricha, 192

Callitriche hermaphroditica, 21

Calpigyne frutescens, 49

— *hainanensis*, 51

Calyptanthus rostrata, 397

Camellia pubicosta, 183

Camellina microcarpa, 17

— *sativa*, 17

Campanula aurita, 25

Canavalia papuana, 406

Cannabis sativa, 14

Capparis Petelotii, 166

— *yunnanensis*, 167

Caragana arborescens, 20

Cardamine oligosperma, 18

Cardaria Draba repens, 17

— *pubescens elongata*, 17

Carex aenea, 12

— *angarae*, 12

— *atherodes*, 12

— *Garberi bifaria*, 12

— *interior*, 12

— *Kelloggii*, 12

— *lanuginosa*, 12

— *macloviana*, 12

— *misandra*, 12

— *montanensis*, 12

— *paupercula irrigua*, 12

— *retrorsa*, 13

— *scirpoidea*, 12

— *stenophylla enervis*, 12

— *stipata*, 12

— *sychnocephala*, 12

— *trichocarpa aristata*, 12

Careya jambosoides, 262

Carum Carui, 22

Cassytha Archboldiana, 155

— *filiformis*, 154

— — *pubescens*, 154

— — *subpubescens*, 154

— *tenuis*, 155

Castilleja fulva, 24

— *Henryi*, 24

— *Raupii typica*, 24

Catalogue of the vascular plants of the Peace and Upper Liard River regions, Additions to a, 1

Cephaelis siamica, 195

Cerastium Keysseri, 387

— *papuanum geminiflorum*, 387

— — *phaenops eciliatum*, 387

— *vulgatum*, 16

Ceratophyllum demersum, 16

— *submersum*, 390

Chamaerhodos Nuttallii, 20

Cheilosa Whiteana, 507

Chenopodium capitatum, 15

— *glaucum*, 15

— *rubrum*, 15

Chrysanthemum Leucanthemum pinnatifidum, 26

Cicca sinica, 31

Cicuta bulbifera, 22

— *occidentalis*, 22

Cinna latifolia, 11

Cinnamomum Archboldianum, 113

— *Clemensii*, 113

— *solomonense*, 112

Cirsium arvense, 27

— *Drummondii*, 27

— *involucratum*, 197

Citronella apogon, 493

- Citronella paniculata*, 60
Claoxylon subsessiliflorum, 506
Cleistanthus concinnus, 41
— *dubius*, 36
— *Eberhardtii*, 39
— *indochinensis*, 40
— *longipedicellatus*, 29
— *Petelotii*, 40
— *Pierrei*, 39
— *sageretioides*, 39
— *tonkinensis*, 39
Cleome serrulata, 16
Cleyera integrifolia, 478
— *serrulata*, 478
Cnicus involucratus, 197
Coelodepas, 50
— *hainanense*, 51
— *spec.*, 49
Conringia orientalis, 17
Convolvulus cairicus, 192
Corallorrhiza Mertensiana, 13
— *striata*, 13
Cornus controversa, 187
— *oligophlebia*, 187
— — *impressinervis*, 188
— *stolonifera Baileyi*, 22
Couthovia leucocarpa, 412
— *macrophylla*, 411
— *novo-brittanica*, 410
Crataegus columbiana, 19
Crepis cineripappa, 197
— *primulifolia*, 197
— *tectorum*, 27
— *virens*, 27
CROIZAT, LEON. A study of *Manihot* in North America, 216
— New and critical Euphorbiaceae from the tropical Far East, 495
— New species of *Croton* L. from New Guinea, 369
— On certain Euphorbiaceae from the tropical Far East, 29
Croton L. from New Guinea, New species of, 369
Croton adumbratus, 495
— *argyratus*, 501
— *argyratus*, 501
— *avellaneus*, 498
— *babuyanensis*, 499
— *batangasensis*, 499
— *biaroensis*, 496
— *Brassii*, 369
— *caryocarpus*, 44
— *cascarilloides*, 46
— *consanguineus*, 503
— — *genuinus*, 504
— — *molliusculus*, 504
Croton cotabatensis, 500
— *Cumingii*, 46
— — *angustifolius*, 46
— *cupreus*, 501
— *focculosus*, 45
— *hainanensis*, 46
— *heterocarpus*, 505
— *ignifex*, 43
— *Kurzii*, 45
— *kwangsiensis*, 42
— *laevigatus*, 46
— *lancilimbus*, 503
— *Laui*, 46
— *leiophyllus*, 506
— *leytensis*, 502
— *limitincola*, 45
— *Luciae*, 370
— *luzoniensis*, 504
— — *bataanensis*, 504
— — *genuinus*, 504
— *mallotophyllus*, 372
— *morobensis*, 369
— *murex*, 41
— *Novae-Astigis*, 499
— *oreoborneicus*, 496
— *palawanensis*, 505
— *pampangensis*, 502
— *philombros*, 371
— *phuquocensis*, 44
— *Pierrei*, 46
— *pilargyros*, 372
— *pontis*, 44
— *potabilis*, 42
— *punctatus*, 46
— *pusilliflorus*, 374
— *Quisumbingianus*, 500
— *rectipilus*, 501
— *scopuligenus*, 43
— *semunculus*, 374
— *tawaoensis*, 497
— *Wassi-Kussae*, 375
— *Ysabelae*, 375
Crudia subsimplicifolia, 399
Cryptocarya annamensis, 459
— *Archboldiana*, 143
— *argyrophylla*, 134
— *aureobrunnea*, 142
— *bernhardiense*, 144
— *Brassii*, 137
— *brevipes*, 139
— *camptodroma*, 134
— *chinensis*, 454
— *Chingii*, 455
— *concinna*, 454
— *cordata*, 138
— *densiflora*, 454
— *exfoliata*, 135

- Cryptocarya globosa*, 137
 — *hainanensis*, 454
 — *Howi*, 458
 — *idenburgensis*, 136
 — *Kajewskii*, 144
 — *Laui*, 455
 — *Ledermannii*, 145
 — *Leiana*, 456
 — *lenticellata*, 457
 — *Maclurei*, 454
 — *Merrilliana*, 456
 — *Metcalfiana*, 457
 — *minutifolia*, 146
 — *obtusifolia*, 454
 — *palmerensis*, 140
 — *pergamentacea*, 141
 — *perlucida*, 145
 — *scalariformis*, 135
 — *subfalcata*, 142
 — *sulcata*, 140
 — *tetragona*, 133
 — *Tsangii*, 459
 — *umbonata*, 139
 — *Whiteana*, 143
Cryptocoryne longispatha, 156
Cudrania fruticosa, 157
Cynometra alternifolia, 399
 — *novo-guineensis*, 397
Cyrtotropis carnea, 169
Cytisus nigricans, 378
 — *triflorus*, 378
 — *villosus*, 378
Dalbergia Albertisii, 401
 — *densa australis*, 403
 — *novo-guineensis*, 402
 — *rivularis*, 402
Danthonia intermedia, 11
Daphnandra novoguineensis, 443
Decaspermum belense, 234
 — *Coriandri*, 234
 — *exiguum*, 235
 — *Forbesii*, 235
 — *humifusum*, 236
 — *neurophyllum leve*, 233
 — *nitentifolium*, 234
 — *nivale*, 236
 — *simile*, 236
Deeringia amaranthoides, 385
 — *baccata*, 385
 — *celosioides*, 385
Degeneria, 357
 — *vitiensis*, 357
Degeneriaceae, a new family of flowering plants from Fiji, 356
Degeneriaceae, 357
Dehaasia borneensis, 445
 — *Cairocan*, 445
 DELISLE, ALBERT L. & KENNETH V. THIMANN. Notes on the rooting of some conifers from cuttings, 103
Dendrolobium triangulare, 170
Derris elegans, 403
 — *heptaphylla*, 403
 — *Koolgibberah*, 403
Descurainia Richardsonii, 18
 — *Sophia*, 18
Desmodium cephalotes, 170
 — *triangulare*, 170
Desmos monogynus, 163
 DEUBER, CARL G. The vegetative propagation of eastern white pine and other five-needled pines, 198
Dicoelia Beccariana, 38
Dinochloa alata, 100
Diplophragma tetragulare, 193
Distichlis stricta, 10
Draba glabella, 16
 — *lanceolata*, 17
 — *luteola*, 16
 — *McCallae*, 17
 — *nemorosa leiocarpa*, 17
 — *nivalis*, 16
Dracaena terniflora, 157
Drimys amplexicaulis, 438
 — *ariakensis*, 423
 — *Brassii*, 421
 — *bullata*, 426
 — *buxifolia*, 419
 — *calothyrsa*, 427
 — *hatamensis*, 425
 — *macrantha*, 422
 — *microphylla*, 418
 — *obovata*, 424
 — *oligandra*, 420
 — *reticulata*, 423
 — *rubiginosa*, 420
 — *sororia*, 427
Dryadodaphne, 442
 — *celastroides*, 443
 — *novoguineensis*, 443
Dryopteris fragrans, 8
 — *Linnaeana*, 8
 — *Robertiana*, 8
 — *spinulosa*, 8
 — — *dilatata*, 8
Dysoxylum Gobara, 173.
 — *procerum*, 173
Echinocarpus sinensis, 182
Echinocystis lobata, 25
Elaeagnus commutata, 21
 — *Delavayi*, 186
 — *Loureirii*, 186
Elaeocarpus limiteanus, 181
 — *linearifolius*, 181

- Elaeocarpus Maclurei*, 181
 — *Petelotii*, 181
Eleocharis palustris major, 12
Elmerrillia papuana, 441
Elymus glaucus, 10
Embelia oblongifolia, 354
 — *polypodioides*, 354
Emmotum, 480
 — Sect. *Brevistyla*, 480
 — Subg. *Euemmotum*, 480
 — Sect. *Longistyla*, 480
 — Subg. *Pogopetalum*, 480
 — *acuminatum*, 486
 — *affine*, 490
 — *apogon*, 493
 — *argenteum*, 485
 — *conjunctum*, 491
 — *fagifolium*, 492
 — *floribundum*, 487
 — *fulvum*, 493
 — *glabrum*, 488
 — *holosericeum*, 490
 — *nitens*, 483
 — — *angustifolium*, 485
 — *nudum*, 485
 — *orbiculatum*, 489
 — *orbiculatum*, 485
Endiandra Archboldiana, 153
 — *Brassii*, 146
 — *Clemensii*, 147
 — *fulva*, 150
 — *glandulosa*, 148
 — *glauca*, 150
 — *grandifolia*, 146
 — *hainanensis*, 461
 — *impressicosta*, 151
 — *Ledermannii*, 149
 — *Merrilliana*, 149
 — *montana*, 152
 — *solomonensis*, 152
 — *sphaerica*, 150
 — *Teschneriana*, 152
Epilobium densum, 22
 — *palustre monticola*, 22
Epiprinus, 53
 — subgen. *Euepiprinus*, 53
 — subgen. *Symphyllia*, 53
 — *lanceifolius*, 53
 — *mallotiformis*, 53
 — *siletianus*, 53
Equisetum arvense serotina, 8
 — *fluviatile*, 8
Erigeron angulosus kamtschaticus, 25
 — *caespitosus*, 26
 — *canadensis*, 26
 — *elatus*, 25
 — *elongatus*, 25
Erigeron jucundus, 26
Eriophorum angustifolium, 12
 — *medium*, 12
 — *viridicarinatum*, 12
Erucastrum gallicum, 17
Erycibe subspicata, 192
Erysimum cheiranthoides, 18
Eucalyptus clavigera, 85
 — *papuana*, 86
 — *tereticornis*, 86
 — *terminalis*, 86
Eugenia argyrocalyx, 264
 — *Bartonii*, 250
 — *bibracteata*, 249
 — *Brassii*, 247
 — *Buettneriana*, 295
 — *cornifolia*, 278
 — *Daphne*, 254
 — *daphnoides*, 270
 — *decipiens*, 281
 — *duplomarginata*, 249
 — *effusa*, 292
 — *finisterrae*, 295
 — *flavescens*, 278
 — *Forbesii*, 261
 — *garcinioides*, 249
 — *glomerata*, 250
 — *hemilampra*, 248
 — *jambosoides*, 262
 — *javanica*, 259
 — *laevifolia*, 248
 — *LeHuntei*, 250
 — *longipes*, 274
 — *malaccensis*, 269
 — *merokensis*, 250
 — *micrandra*, 294
 — *monetaria*, 249
 — *neurocalyx*, 289
 — *nivifera*, 250
 — *nulans*, 263
 — *pergamacea*, 250
 — *plumea*, 296
 — *porphyrocarpa*, 250
 — *pterocalyx*, 253
 — *pyrocarpa*, 280
 — *rubropunctata*, 268
 — *salicina*, 254
 — *salomonensis*, 273
 — *salpingantha*, 250
 — *Schumanniana*, 289
 — *scolopacina*, 241
 — *sogerensis*, 250
 — *subalata*, 249
 — *sylvana*, 295
 — *trichotoma*, 250
 — *trivenis*, 288
 — *Vandewateri*, 249

- Eugenia Wollastonii*, 249
 — *xylantha*, 280
Eupatorium odoratum, 197
Euphorbia glyptosperma, 21
 — *serpyllifolia*, 21
Euphorbiaceae from the tropical Far East,
 New and critical, 495
Euphorbiaceae from the tropical Far East,
 On certain, 29
Euphrasia subarctica, 24
Eupomatia Belgraveana, 367
Fagopyrum esculentum, 14
Fagraea Archboldiana, 412
 — *aurantiodora*, 415
 — *Bodenii*, 414
 — *Cabbagei*, 413
 — *elata*, 413
 — *obtusifolia*, 415
 — *papuana*, 414
 — *salomonensis*, 415
Fenzlia obtusa, 89
Festuca saximontana, 9
Ficus heterostyla, 158
 — *pubilimba*, 159
Fissistigma villosissimum, 163
 — *villosum*, 164
Flueggea Spirei, 32
Fluminia festucacea, 9
Gaillardia aristata, 26
Galbulimima, 367
 — *baccata*, 368
 — *Belgraveana*, 367
 — *nitida*, 368
 — *parvifolia*, 368
Galium aparine, 25
Gaura chinensis, 407
Geniostoma Archboldianum, 408
 — *Brassii*, 409
 — *Gilgii*, 409
 — *obtusum*, 410
 — *Randianum*, 409
 — *stenophyllum*, 409
Genista triflora, 378
Gentiana cephalantha, 190
Geranium nemorale Bicknellii, 21
Geum aleppicum strictum, 20
 — *strictum*, 20
Glinus oppositifolius, 386
 — *Spergula*, 386
Glochidion flavum, 36
Glyceria grandis, 9
Gomphandra Chingiana, 175
 — *mollis*, 175
 — *Petelotii*, 176
Gompholobium papuanum, 400
Goniocarpus scaber, 407
Goodyera decipiens, 13
Goodyera repens, 13
Grindelia perennis, 25
Guarea disyphonia, 173
 — *Gobara*, 173
 — *procera*, 173
Gymnema affine, 191
 — *alterniflorum*, 191
 — *formosanum*, 192
Gynostemma elongatum, 196
 — *integrifoliolum*, 196
Haasia borneensis, 445
Habenaria viridis interjecta, 13
Hackelia deflexa, 23
Halenia deflexa, 23
Haloragis acanthocarpa, 407
 — *chinensis*, 407
 — *nemorosa*, 408
 — *scabra*, 407
 — — *elongata*, 407
Hansemannia gawadensis, 392
 — *mollis*, 393
Hardwickia alternifolia, 399
Hartighsea Gobara, 173
Hedyotis Linnaeus versus Oldenlandia
 Linnaeus and the status of *Hedyotis*
 lancea Thunberg in relation to *H. con-*
 sanguinea Hance, 226
Hedyotis caudatifolia, 228
 — *consanguinea*, 228
 — *effusa*, 193
 — *lancea*, 228, 229
 — *longiexserta*, 229
 — *minutopuberula*, 229
 — *nigrescens*, 193
 — *Parryi*, 193
 — *subdivaricata*, 193
 — *tetrangularis*, 193
Hedysarum alpinum grandiflorum, 20
 — *boreale*, 20
 — *cephalotes*, 170
 — *triangulare*, 170
Helianthus annuus, 26
 — *giganteus*, 26
Helicia brevipetiolata, 160
 — *hainanensis*, 159
Hemsleya elongata, 196
Hesperis matronalis, 18
Himantandra, 367
 — *baccata*, 367
 — *Belgraveana*, 367
 — *nitida*, 368
 — *parvifolia*, 368
Himantandraceae, A nomenclatural note
 on the, 366
Homalium tonkinense, 185
Hordeum jubatum, 10

- HOWARD, RICHARD A. Studies of the Icacineae, II. Humirianthera, Leretia, Mappia and Nothapodytes, valid genera of the Icachineae, 55
 — Studies of the Icacinaceae, III. A revision of Emmotum, 479
 Humirianthera, Leretia, Mappia and Nothapodytes, valid genera of the Icachineae. Studies of the Icacinaceae, II, 55
 Humirianthera ampla, 76
 — *crispula*, 77
 — *Duckei*, 76
 — *rupestris*, 75
 Hydrangea *indochinensis*, 167
 Hypericum majus, 21
 Icacina dubia, 63
 — *Poeppigiana*, 58
 — *senegalensis*, 66
 Icacinaceae, II. Humirianthera, Leretia, Mappia and Nothapodytes, valid genera of the Icachineae, Studies of the, 55
 Icacinaceae, III. A revision of Emmotum, Studies of the, 479
 Illigera cordata, 166
 — *cordata*, 165
 — *mollissima*, 165
 — *Petelotii*, 165
 — *yaoshanensis*, 166
 Impatiens biflora, 21
 Indosasa *angustata*, 93
 — *gibbosa*, 93
 — *solearis*, 94
 Ipomoea cairica, 192
 — *palmata*, 192
 Isomerocarpa, 442
 — *novoguineensis*, 443
 Iva axillaris, 26
 — *xanthifolia*, 26
 Ixora *cephalophora*, 194
 — *diversifolia flexilis*, 195
 — *flexilis*, 195
 Jambosa *aeorantha*, 249
 — *alutacea*, 270
 — *attenuata*, 295
 — *auriculata*, 286
 — *brevicyma*, 261
 — *Bruynii*, 249
 — *caryophylloides*, 264
 — *cladoptera*, 249
 — *combretiflora*, 286
 — *cornifolia*, 278
 — *decoriflora*, 249
 — *dolichophylla*, 249
 — *dolichostyla*, 272
 — *eximiflora*, 253
 — *floribunda*, 268
 — *Jambosa gonatantha*, 256
 — *goniocalyx*, 262
 — *gonioptera*, 259
 — *hylocharis*, 249
 — *hylophila*, 273
 — *javanica*, 259
 — *keroantha*, 271
 — *Keysseri*, 253
 — *lagynocalyx*, 249
 — *Leonhardi*, 258
 — *longipes*, 274
 — — *leptopoda*, 274
 — *megalosperma*, 264
 — *micrantha*, 249
 — *najadum*, 249
 — *nutans*, 263
 — *ovalifolia*, 260
 — *pachyantha*, 249
 — *pachyclada*, 258
 — *phacelantha*, 249
 — *Pilgeriana*, 255
 — *platycarpa*, 278
 — *polyphlebia*, 249
 — *pteropoda*, 263
 — *pycnantha*, 259
 — *riparia*, 249
 — *Roemeri*, 275
 — *rubella*, 275
 — *sabangensis*, 249
 — *Sargentiana*, 249
 — *Schumanniana*, 289
 — *soliflora*, 254
 — *synaptoneura*, 249
 — *Thomsoni*, 249
 — *trachyantha*, 249
 — *tricolor*, 255
 — *tympnantha*, 255
 — *verniciflora*, 249
 — *Versteegii*, 256
 — *xylopiacea*, 249
 Janipha *aesculifolia*, 218
 — *carthagenensis*, 217
 — *Manihot angustiloba*, 223
 Jasminum trineuron, 188
 Juncus alpinus *insignis*, 13
 — — *rariflorus*, 13
 — *bufonius*, 13
 — *castaneus*, 13
 — *Dudleyi*, 13
 — *Richardsonianus*, 13
 Killipiodendron, 231
 — *colombianum*, 231
 Killipiodendron, Studies in the Theaceae, XI, 231
 Kingiodendron alternifolium, 399
 Knema *Petelotii*, 164
 Kobresia Bellardi, 12

- KOBUSKI, CLARENCE E. Studies in the Theaceae, XI. *Killipiodendron*, 231
 — Studies in the Theaceae, XII. Notes on the South American species of *Ternstroemia*, 298
 — Studies in the Theaceae, XIII. Notes on the Mexican and Central American species of *Ternstroemia*, 464
Lactuca biennis, 27
 — *scariola integrifolia*, 27
 — *spicata*, 27
Lappula echinata, 23
Lathyrus ochroleucus, 20
 Lauraceae, IV. Preliminary study of the Papuasian species collected by the Archbold Expeditions, Studies in the, 112
 Lauraceae, V. Some eastern Asiatic species of *Beilschmiedia* and related genera, Studies in the, 444
Lauromerrillia, 460
 — *appendiculata*, 460
Ledum palustre decumbens, 23
Lembotropis triflora, 378
Lemna trisulca, 13
Lepidium Draba, 17
 — *sativum*, 17
 Leretia, Mappia and Nothapodytes, valid genera of the Icachineae, Studies of the Icacinaceae, II. *Humirianthera*, 55
Leretia ampla, 76
 — *angustifolia*, 62
 — *cordata*, 58
 — *glabrata*, 60
 — *mexicana*, 61
 — *nitida*, 58
 — *paniculata*, 60
 — *parviflora*, 60
 — *Poeppigiana*, 58
 — *racemosa*, 63
 — — *brachycarpa*, 64
 — *Vellozii*, 58
Lesquerella arctica, 17
Lilium philadelphicum andinum, 13
Limosella aquatica, 24
Linaria minor, 24
 — *reticulata*, 24
 — *vulgaris*, 24
Lingnania atra, 98
 — *cerosissima*, 101
 — *parviflora*, 101
 — *remotiflora*, 101
 — *sesquiflora*, 99
Linociera macrothyrsa, 189
 — *subcapitata*, 189
Linum usitatissimum, 21
Litsea alveolata, 121
 — *bernhardensis*, 125
Litsea Brassii, 125
 — *breviumbellata*, 121
 — *complanata*, 128
 — *crenata*, 120
 — *domarensis*, 128
 — *fulvosericca*, 120
 — *habbemensis*, 123
 — *mafuluensis*, 129
 — *morobensis*, 124
 — *papillosa*, 123
 — *perglabra*, 126
 — *perlucida*, 124
 — *solomonensis*, 127
 — *Versteeghii*, 122
 — *Whiteana*, 125
Lomatium foeniculaceum, 22
Lonicera involucrata, 25
 — *notha*, 25
 — *oreodoxa*, 381
 — *Rockii*, 380
 — *Ruprechtiana* × *tartarica*, 25
Luzula arcuata, 13
Lychnis alba, 16
 — *Drummondii*, 16
Lycopodium clavatum, 8
Lyonia annamensis, 188
 — *chapaensis*, 188
Macaranga Poilanei, 51
 — *rosuliflora*, 51
 — *trigonostemonoides*, 51
Madia glomerata, 26
Maesa perlarius, 344
 — *sinensis*, 344
 — *tonkinensis*, 344
 — — *annamensis*, 344
 — — *Bonii*, 344
 — — *macrodonta*, 344
 — — *montana*, 344
Mallotus Caput-Medusae, 48
 — *Tsiangii*, 51
Malva neglecta, 21
 — *rotundifolia*, 21
 Manihot in North America, A study of, 216
Manihot aesculifolia, 218
 — *angustiloba*, 223
 — *carthagenensis*, 217
 — *carthaginensis*, 222
 — *chlorosticta*, 222
 — *colimensis*, 221
 — *Davisiae*, 224
 — *gualanensis*, 218
 — *intermedia*, 221
 — *isoloba*, 223
 — *ludibunda*, 219
 — *mexicana*, 220
 — *parvicocca*, 219

- Manihot rhomboidea*, 219
 — *rubricaulis*, 222
Maniltoa Brassii, 398
 — *cynometroides*, 397
 — *plurijuga*, 398
Mappia and *Nothapodytes*, valid genera of the Icacinaceae, Studies of the Icacinaeae, II. *Humirianthera*, *Leretia*, 55
Mappia § *Trichocrater*, 66
 — *affinis*, 63
 — *ampla*, 76
 — *angustifolia*, 62
 — *cambodiana*, 70
 — *Championiana*, 70
 — *cordata*, 58
 — *dimorpha*, 68
 — *foetida*, 70
 — *Gardneriana*, 70
 — *mexicana*, 61
 — *montana*, 67
 — *nitida*, 58
 — *oblonga*, 70
 — *obtusifolia*, 70
 — *origanoides*, 66
 — *ovata*, 70
 — *philippinensis*, 66, 73
 — *pittosporoides*, 68
 — *Poeppigiana*, 58
 — *racemosa*, 63
 — — *brachycarpa*, 64
 — — *typica*, 64
 — *senegalensis*, 66
 — *tomentella*, 70
 — *tomentosa*, 70
 — *Wightiana*, 70
Mastixiodendron pachyclados, 416
Matricaria inodora, 26
 — *maritima agrestis*, 26
 — *matricarioides*, 26
 McCLURE, F. A. New Bamboos, and some new records, from French Indo-China, 93
Mearnsia cordata, 81
 — *ovata*, 81
 — *scandens*, 81
Medicago falcata, 20
 — *lupulina*, 20
 — *sativa*, 20
Melaleuca Cunninghamii, 87
 — — *glabra*, 87
 — *Leucadendron*, 88
 — — *Cunninghamii*, 87
 — — *minor*, 88
 — — *sanguinea*, 87
 — *symphyocarpa*, 89
 — — *aurantiaca*, 89
 — *viridiflora*, 89
Melilotus alba, 20
 — *officinalis*, 20
Meliosma angustifolia, 179
 — *coriacea*, 178
 — *crassifolia*, 179
 — *longipes*, 178
Melodinus brachyphyllus, 191
Melodorum villosum, 164
 MERRILL, E. D. Records of Indo-Chinese plants, III, 156
 — & F. P. METCALF. *Hedyotis* Linnaeus versus *Oldenlandia* Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance, 226
 — & L. M. PERRY. *Plantae Papuanae Archboldianae*, IX, X, 233, 383
 METCALF, F. P. & E. D. MERRILL. *Hedyotis* Linnaeus versus *Oldenlandia* Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance, 226
Metrosideros ornata, 79
 — *parallelinervis*, 79
 — *parviflora*, 80
 — *Pullei*, 80
 — — *parvifolia*, 80
 — *Regeli*, 81
 — *sp.*, 79
Mezoneurum Scortechinii, 399
Microtropis rhynchocarpa, 174
Millettia australis, 401
Mimosa pennata, 396
Mitrasacme alsinoides, 410
Mokofua alnifolia, 310
 — *andina*, 325
 — *brasiliensis*, 314
 — *carnosa*, 335
 — *clusiaefolia*, 336
 — *congestiflora*, 316
 — — *crassifolia*, 338
 — *cuneifolia*, 340
 — *delicatula*, 308
 — — *dentata*, 331
 — *laevigata*, 332
 — — *longipes*, 337
 — — *Lorentzii*, 335
 — — *meridionalis*, 325
 — — *oleaeifolia*, 330
 — *punctata*, 307
 — *Ruiziana*, 342
 — *Schomburgkiana*, 313
 — *Seemanni*, 471
 — *silvatica*, 473
 — *tepezapote*, 475
 — *venosa*, 342
 — *verticillata*, 333
Mollugo oppositifolia, 386

- Mollugo pentaphylla*, 386
 — *stricta*, 386
Monolepis Nuttalliana, 15
Monotropa uniflora, 22
Montia lamprosperma, 386
Mucuna Baileyana, 404
 — *brachycarpa*, 405
 — *discolor*, 405
 — *elegans*, 406
Muhlenbergia squarrosa, 11
Myrioneuron effusum, 195
 — *nutans effusa*, 195
Myriophyllum exalbescens, 22
 — *spicatum*, 22
Myrsinaceae, New and critical Chinese and Indo-Chinese, 344
Myrsine marginata, 354
 — *stolonifera*, 354
Myrtaceae, Some Papuan, 79
Myrtella Beccarii, 90
Myrtus acuminatissima, 247
 — *Archboldiana*, 239
 — *Brassii*, 239
 — *flavida*, 242
 — *nivalis*, 236
 — *Randiana*, 237
 — *samarangensis*, 259
 — *Versteeghii*, 238
Nelitris Coriandri, 234
Neoleretia, 66
 — *dimorpha*, 68
 — *foetida*, 70
 — *philippinensis*, 73
 — *pittosporioides*, 68
Neolitsea Archboldiana, 118
 — *Brassii*, 118
 — *Teschneriana*, 119
Nephrostylus Poilanei, 51
Neslia paniculata, 17
 New and critical Chinese and Indo-Chinese *Myrsinaceae*, 344
 New and critical *Euphorbiaceae* from the tropical Far East, 495
 New bamboos, and some new records, from French Indo-China, 93
 New species of *Croton* L. from New Guinea, 369
 New species, varieties and combinations from the collections of the Arnold Arboretum, 377
 Nomenclatural note on the *Himantandraceae*, A, 366
 Notes on the rooting of some conifers from cuttings, 103
Nothaphoebe Archboldiana, 115
Nothapodytes, valid genera of the *Icacinaceae*, Studies of the *Icacinaceae*, II. *Humirianthera*, *Leretia*, *Mappia* and, 55
Nothapodytes, 66
 — *dimorpha*, 68
 — *foetida*, 70
 — *montana*, 67
 — *obtusifolia*, 70
 — *philippinensis*, 73
 — *pittosporoides*, 68
Nymphaea Brownii, 389
 — *dictyophlebia*, 390
 — *macrosperma*, 389
 — *violacea*, 389
Oenanthe sarmentosa, 22
Oenothera strigosa, 22
Oldenlandia Linnaeus and the status of *Hedyotis lancea* Thunberg in relation to *H. consanguinea* Hance, *Hedyotis Linnaeus* versus, 226
Oldenlandia consanguinea, 228
 — *lancea*, 228
 — *subdivaricata*, 193
 — *tetrangularis*, 193
 On certain *Euphorbiaceae* from the tropical Far East, 29
Opuntia fragilis, 21
Ormosia calavensis, 400
Ostodes Katherinae, 507
Oxytropis Paysoniana, 20
 — *retrorsa*, 20
Panax pseudo-ginseng, 187
 Papuanian Plants, V, Studies of, 417
Paracleisthus Eberhardtii, 39
 — *Pierrei*, 39
 — *tonkinensis*, 39
Paris Delavayi, 157
 — *Fargesii*, 157
 — *hainanensis*, 157
Parkia Versteeghii, 396
Parnassia palustris neogaea, 19
 — *parviflora*, 19
Passiflora pertriloba, 186
Pastinaca sativa, 22
Patascoya Steubelii, 343
Pedicularis labradorica, 24
 — *Langsdorfii*, 24
Penstemon Gormanii, 24
 — *procerus*, 24
 PERRY, L. M. & E. D. MERRILL. *Plantae Papuanae Archboldianae*, IX, X, 233, 383
Phacelia tanacetifolia, 23
Phalaris arundinacea, 11
 — *canariensis*, 11
Phanera coccinea, 170
Phoebe Clemensii, 114

- Phyllanthodendron § **Calophyllum**, 34
 — § **Euphyllanthodendron**, 33
 — § **Pseudoactephila**, 33
 — *album*, 35
 — *anthopotamicum*, 37
 — *carinatum*, 36
 — *Cavaleriei*, 37
 — *coriaceum*, 35
 — *dubium*, 36
 — *Dunnianum*, 37
 — — *hypoglaucum*, 37
 — *lativenium*, 36
 — *ligulatum*, 33, 34
 — *mirabile*, 34
 — **Poilanei**, 34
 — *roseum*, 33, 35
 — — *siamensis*, 35
 — *siamense*, 35
 — *yunnanense*, 36
 Phyllanthus *albus*, 35
 — *anthopotamicus*, 37
 — *carinatus*, 36
 — **discofractus**, 31
 — *Dunnianus*, 37
 — *lingulatus*, 34
 — — *tonkinensis*, 34
 — *mirabilis*, 34
 — *nobilis genuinus*, 31
 — **Petelotii**, 30
 — *Poilanei*, 34
 — *roseus*, 35
 — — *glabrum*, 35
 — *rubicundus*, 38
 — *sinicus*, 31
 Picea *Engelmanni*, 8
 — *glauca albertiana*, 8
 Pieris *annamensis*, 188
 — *chapaensis*, 188
 Pinus *Banksiana*, 8
 — *divaricata*, 8
 Piptadenia *novo-guineensis*, 396
 Pithecellobium *Clypearia velutinum*, 394
 — **novo-guineense**, 394
 — *palauense*, 393
 Pithecolobium *palauense*, 393
 Plantae Papuanae Archboldianae, IX, X,
 233, 383
 Plantago *lanceolata*, 25
 — *major*, 25
 Pleomele **terniflora**, 157
 Pleurisanthes *parviflora*, 60
 Poa *abbreviata*, 10
 — *annua*, 10
 — *compressa*, 10
 — *nervosa*, 10
 — *trivialis*, 10
 Podadenia *javanica*, 49
 — *sapida*, 48
 — *Thwaitesii*, 48
 Pogonpetalum, 480
 — *acuminatum*, 486
 — *acutum*, 492
 — *affine*, 490
 — *nitens*, 483
 — *orbiculatum*, 489
 Polemonium *lanatum humile*, 23
 — *occidentale*, 23
 — *rotatum*, 23
 Polygala *Senega*, 21
 Polygonum *achoreum*, 14
 — *benguetense*, 384
 — *coccineum*, 14
 — *Convolvulus*, 14
 — *Douglasii*, 14
 — *lapathifolium*, 385
 — *macranthum*, 161
 — *minus decipiens*, 385
 — — *depressum*, 385
 — *praetermissum*, 161
 — *runcinatum papuanum*, 385
 — *scabrum*, 14
 — *Thunbergii*, 161
 — *tomentosum*, 14
 Portulaca *quadrifida*, 386
 Potamogeton *Friesii*, 9
 — *pectinatus*, 9
 — *praelongus*, 9
 — *pusillus tenuissimus*, 9
 — *Richardsonii*, 9
 Potentilla *Anserina*, 20
 — *biflora*, 19
 — *glabrella*, 19
 — *gracilis Nuttallii*, 19
 — *Hippiana*, 20
 — *millegrana*, 19
 — *norvegica hirsuta*, 19
 Prenanthes *racemosa*, 27
 Primula *egaliksensis violacea*, 23
 Psychotria *siamica*, 195
 — *Thorelii*, 195
 Pterocarpus *australis*, 401
 Ptychopyxis subg. **Neocalpigyne**, 48
 — subg. **Podadenia**, 48
 — *angustifolia*, 48
 — **bacciformis**, 49
 — *Caput-Medusae*, 48
 — *costata*, 48
 — *frutescens*, 49
 — *javanica*, 49
 — *philippina*, 49
 — **Poilanei**, 50
 — **Thwaitesii**, 48
 Puccinellia *airoides*, 10
 — *distans tenuis*, 9

- Puccinellia Nuttalliana*, 10
Pygeum affine, 168
— *brachybotrys*, 169
Pyrola asarifolia, 22
— *secunda*, 22
Radicula Armoracia, 18
Ranunculus acris, 16
— *Gmelini Purshii*, 16
— *hyperboreus*, 16
— *pennsylvanicus*, 16
— *trichophyllus typicus*, 16
Rapanea capitellata macrocarpa, 355
— — *microcarpa*, 355
— *neriifolia*, 355
— — *yunnanensis*, 355
RAUP, HUGH M. Additions to a catalogue of the vascular plants of the Peace and Upper Liard River regions, 1
Records of Indo-Chinese plants, III, 156
REHDER, ALFRED. New species, varieties and combinations from the collections of the Arnold Arboretum, 377
Rhamnus subapetalus, 179
Rhinanthus Kyrollae, 24
Rhodamnia cinerea, 90
— *spongiosa*, 90
Rhododendron oxyphyllum, 188
Rhodomyrtus calophlebia, 91
— *macrocarpa*, 90
— *novoguineensis*, 90
— *pinnatinervis*, 90
— *trineura*, 91
Ribes hirtellum, 19
Rootings of some conifers from cuttings, Notes on the, 103
Rorippa islandica hispida, 18
— — *microcarpa*, 18
— *palustre hispida*, 18
Rourea simulans, 391
Rubus arcticus, 19
— *barbatus*, 377
— *idaeus aculeatissimus albus*, 377
— — *albus*, 377
— — *albus*, 377
— — *strigosus albus*, 377
— — — *succineus*, 377
— — *vulgatus luteofructifer*, 377
— *nutans*, 377
— *parviflorus bifarius*, 19
— *pedatus*, 19
— *strigosus albus*, 377
Rumex Acetosella, 14
— *Brownii*, 384
— *mexicanus*, 14
— *nepalensis*, 162
Sagina belonophylla, 387
— *echinosperma*, 388
Sagina papuana, 388
Salicornea europaea, 15
Salix discolor, 14
— *glauc*, 14
— *MacCalliana*, 13
— *Scouleriana*, 14
Salsola Kali tenuifolia, 15
Sanguisorba canadensis latifolia, 20
— *sitchensis*, 20
Sapium plumerioides, 507
Satureja origanoides, 66
Saurauia macrotricha, 183
Schima khasiana macrocarpa, 184
— — *sericans*, 184
Schizostachyum hainanense, 101
— *pseudolima*, 101
Schleinitzia microphylla, 396
Schnizleinia nitida, 485
Secale cereale, 10
Securinega Spirei, 32
Senecio palustris, 27
— *Purshianus*, 27
— *vulgaris*, 27
Serianthes Ledermannii, 393
— *minahassae*, 393
Setaria viridis, 12
Siagonanthus sericeus, 483
Silene latifolia, 16
— *repens*, 16
Sinobambusa gibbosa, 93
Sisymbrium altissimum, 17
Sloanea sinensis, 182
SMITH, A. C. A nomenclatural note on the Himantandraceae, 366
— Studies of Papuan Plants, V, 417
— & I. W. BAILEY. Degeneriaceae, a new family of flowering plants from Fiji, 356
Solanum nigrum, 24
— *triflorum*, 24
Solidago decumbens oreophila, 25
Some Papuan Myrtaceae, 79
Sonchus arvensis, 27
— — *glabrescens*, 28
— *asper*, 28
— *oleraceus*, 28
Sorbaria sorbifolia, 19
Sorbus scopulina, 19
Sparganium multipedunculatum, 9
Spartocytisus triflorus, 378
Spiradiclis caespitosa, 195
— *leptobotrys longiflora*, 195
Spirodela polyrhiza, 13
Stachys palustris pilosa, 23
Staff of the Arnold Arboretum, 1941-42, 522

- STEARNS, WILLIAM T. Bonpland's "Description des plantes rares cultivées à Malmaison et à Navarre," 110
- Stellaria calycantha*, 15
- *crispa*, 15
- *laxa*, 387
- *media*, 15
- *saxatilis*, 386
- *stellato-pilosa*, 387
- Stemonurus Chingianus*, 175
- *foetidus*, 70
- Sterculia Henryi*, 182
- Stipa columbiana*, 11
- *Richardsonii*, 11
- Streptopus amplexifolius americanus*, 13
- Strongylodon Archboldianus*, 403
- Studies in the Lauraceae, IV. Preliminary study of the Papuan species collected by the Archbold Expeditions, 112
- Studies in the Lauraceae, V. Some eastern Asiatic species of *Beilschmiedia* and related genera, 444
- Studies in the Theaceae, XI. *Killipiodendron*, 231
- Studies in the Theaceae, XII. Notes on the South American species of *Ternstroemia*, 298
- Studies in the Theaceae, XIII. Notes on the Mexican and Central American species of *Ternstroemia*, 464
- Studies of Papuan Plants, V, 417
- Studies of the Icacinaceae, II. *Humiranthera*, *Leretia*, *Mappia* and *Nothapodytes*, valid genera of the Icacinaceae, 55
- Studies of the Icacinaceae, III. A revision of *Emmotum*, 479
- Study of *Manihot* in North America, A, 216
- Suaeda depressa*, 15
- Symphoricarpos albus*, 25
- Symphyllia*, 53
- *mallotiformis*, 53
- *siletiana*, 53
- Symplocarpon Purpusii*, 478
- Syndiclis chinensis*, 462
- Syzygium acetosum*, 280
- *acmenoides*, 291
- *adelphicum*, 292
- *adenanthum*, 292
- *aeoranthum*, 249
- *alutaceum*, 270
- *anomalum*, 250
- *Archboldianum*, 271
- *argyrocalyx*, 264
- *attenuatum*, 295
- *badium*, 281
- *Bartonii*, 250
- Syzygium bibracteatum*, 249
- *bicolor*, 286
- *bracteosum*, 250
- *Brassii*, 277
- *brevicymum*, 261
- *Bruynii*, 249
- *Buettnerianum*, 295
- *callianthum*, 252
- *camptodromum*, 285
- *capituliferum*, 287
- *cartilagineum*, 287
- *caryophylloides*, 264
- *caudiferum*, 272
- *cinctum*, 272
- *cladopterum*, 249
- *combretiflorum*, 286
- *cornifolium*, 278
- *Daphne*, 254
- *daphnoides*, 270
- *decipiens*, 281
- *decoriflorum*, 249
- *delicatulum*, 273
- *dictyophlebium*, 267
- *Dielsianum*, 259
- *discolor*, 274
- *Doctersii*, 283
- *dolichophyllum*, 249
- *dolichostylum*, 272
- *duplomarginatum*, 249
- *effusum*, 292
- *evenulosum*, 261
- *eximiflorum*, 252
- *finisterrae*, 295
- *flavescens*, 278
- *floribundum*, 268
- *folidorhachis*, 276
- *Forbesii*, 261
- *furfuraceum*, 276
- *ganophyllum*, 293
- *garcinioides*, 249
- *gonatanthum*, 256
- *goniocalyx*, 262
- *goniopterum*, 259
- *Grevesianum*, 253
- *heterobotrys*, 257
- *hylochare*, 249
- *hylophilum*, 273
- *insculptum*, 267
- *jambosoides*, 262
- *japense*, 288
- *keroanthum*, 271
- *Keysseri*, 253
- *kietanum*, 279
- *lagerstroemioides*, 262
- *lagynocalyx*, 249
- *laqueatum*, 257

- Syzygium Lauterbachianum*, 268
 — — *phaeophloium*, 268
 — *LeHuntei*, 250
 — *Leonhardi*, 258
 — *leptanthum*, 296
 — *leptoneurum*, 284
 — *leptophlebioides*, 282
 — *leptopodium*, 284
 — *longipes*, 274
 — — *leptopodum*, 274
 — *Lorentzianum*, 288
 — *macrocalyx*, 253
 — *malaccense*, 269
 — *maschalocladum*, 284
 — *megalospermum*, 264
 — *megistophyllum*, 279
 — *merokense*, 249
 — *micrandrum*, 294
 — *micropetalum*, 293
 — *modestum*, 288
 — *monetarium*, 249
 — *multiglandulosum*, 269
 — *myriadenum*, 293
 — *najadum*, 249
 — *nemorale*, 280
 — *niviferum*, 250
 — *novo-guineense*, 286
 — *nutans*, 263
 — *obtusum*, 294
 — *onesimum*, 296
 — *ovalifolium*, 260
 — *pachyanthum*, 249
 — *pachycladum*, 258
 — *pallens*, 251
 — *papuasicum*, 251
 — *pergamaceum*, 250
 — *phacelanthum*, 249
 — *phaeostictum*, 270
 — *Pilgerianum*, 255
 — *platycarpum*, 278
 — *plumeum*, 296
 — *polyphlebium*, 249
 — *porphyrocarpum*, 250
 — *pteropodium*, 263
 — *puberulum*, 263
 — *pyriforme*, 259
 — *pyrocarpum*, 280
 — *Randianum*, 264
 — *Rechingeri*, 249
 — *rectangulare*, 282
 — *retivenium*, 294
 — *Richardsonianum*, 274
 — *riparium*, 249
 — *Roemeri*, 275
 — *rosaceum*, 283
 — *roseum*, 270
 — *rostratum*, 297
 — *Syzygium rubellum*, 275
 — *rubiginosum*, 289
 — *rubropunctatum*, 268
 — *sabangense*, 249
 — *saliciforme*, 253
 — *salicinum*, 254
 — *salomonense*, 273
 — *salpinganthum*, 250
 — *samarangense*, 259
 — *Sargentianum*, 249
 — *Schumannianum*, 289
 — *sogerense*, 250
 — *soliflorum*, 254
 — *spectabile*, 265
 — *squamatum*, 277
 — *subalatum*, 249
 — *subamplexicaule*, 285
 — *subcorymbosum*, 297
 — *subglobosum*, 290
 — *sylvanum*, 295
 — *synaptoneurum*, 249
 — *thalassicum*, 258
 — *Thomseni*, 249
 — *torricellianum*, 252
 — *trachyanthum*, 249
 — *trichotomum*, 250
 — *tricolor*, 255
 — *trivene*, 288
 — *tympananthum*, 255
 — *uniflorum*, 255
 — *vaccinioides*, 256
 — *Vandewateri*, 249
 — *verniciflorum*, 249
 — *vernicosum*, 260
 — *Versteegii*, 256
 — *virescens*, 260
 — *Warburgii*, 250
 — *Waterhousei*, 290
 — *Wollastonii*, 249
 — *xylanthum*, 280
 — *xylopiaceum*, 249
Talauma oreadum, 441
Taonabo alnifolia, 310
 — *andina*, 325
 — *brasiliensis*, 314
 — *Candolleana*, 311
 — *carnosa*, 335
 — *clusiaefolia*, 336
 — *congestiflora*, 316
 — *crassifolia*, 338
 — *cuneifolia*, 340
 — *delicatula*, 308
 — *dentata*, 331
 — *flavifolia*, 335
 — *Jelskii*, 327
 — *Lehmannii*, 324
 — *lineata*, 478

- Taonabo longipes*, 337
 — *Maltbyana*, 468
 — *Maltbyi*, 468
 — *meridionalis*, 325
 — *oleaeifolia*, 330
 — *oocarpa*, 475
 — *Pavoniana*, 338
 — *Pringlei*, 470
 — *punctata*, 307
 — *Schomburgkiana*, 313
 — *Seemanni*, 471
 — *sphaerocarpa*, 475
 — *subserrata*, 340
 — *sylvatica*, 473
 — *tepezapote*, 475
 — *verticillata*, 333
Taraxacum officinale, 27
Tellima grandiflora, 19
Tephrosia leptoclada, 400
 — **maculata**, 401
Ternstroemia, Studies in the Theaceae,
 XII. Notes on the South American
 species of, 298
Ternstroemia, Studies in the Theaceae,
 XIII. Notes on the Mexican and Cen-
 tral American species of, 464
Ternstroemia alnifolia, 309
 — — *lancifolia*, 310
 — *andina*, 325
 — *asymmetrica*, 335
 — **borbensis**, 305
 — **brachypoda**, 332
 — *brasiliensis*, 314
 — — *minor*, 314
 — — *parvifolia*, 314
 — *brevipes*, 321, 325
 — — *Blanchetii*, 322
 — **brevistyla**, 310
 — **Browniana**, 309
 — *camelliaefolia*, 321
 — *Candolleana*, 311
 — — *angustifolia*, 312
 — — *rotundata*, 311
 — *carnosa*, 335
 — — *acutifolia*, 335
 — *chalicophila*, 472
 — **circumscissilis**, 304
 — *clusiaefolia*, 336
 — *congestiflora*, 316
 — *crassifolia*, 338
 — — *suborbicularis*, 338
 — *cuneata*, 342
 — *cuneifolia*, 473
 — *cuneifolia*, 340
 — — *glutinosa*, 340
 — *dehiscens*, 304
 — *delicatula*, 308
Ternstroemia dentata, 330
 — — *latifolia*, 331
 — — *multiflora*, 331
 — — *nudiflora*, 321
 — — *oblongifolia*, 331
 — — *opaca*, 331
 — *discoidea*, 306
 — **distyla**, 317
 — *duidae*, 323
 — — *latifolia*, 324
 — *dura*, 329
 — **Gleasoniana**, 305
 — *globiflora*, 315
 — *globosa*, 315
 — *globuliflora*, 315
 — **grandiosa**, 318
 — *Hemsleyi*, 475
 — — *dentobracteata*, 475
 — *impressa*, 472
 — *Jelskii*, 327
 — **Killipiana**, 341
 — **Klugiana**, 334
 — **Krukoffiana**, 319
 — *laevigata*, 332
 — *Lehmannii*, 324
 — *lineata*, 478
 — *longipes*, 337
 — *macrocarpa*, 321
 — *Maltbyana*, 468
 — *Maltbyi*, 468
 — **megaloptycha**, 474
 — *meridionalis*, 325
 — — *nigricans*, 325
 — *minoriflora*, 315
 — *monosperma*, 306
 — *multiflora*, 331
 — **Mutisiana**, 341
 — *nudiflora*, 322
 — *occidentalis*, 473
 — *oleaeifolia*, 330
 — *oligostemon*, 327
 — *oocarpa*, 475
 — **pachytrocha**, 320
 — *paucifolia*, 324
 — *Pavoniana*, 338
 — — *brachypoda*, 332
 — *peduncularis*, 471
 — **penduliflora**, 311
 — *pentapetala*, 338
 — **polyandra**, 333
 — *Pringlei*, 470
 — *punctata*, 307
 — — *revoluta*, 307
 — *pungens*, 329
 — *Purpusii*, 478
 — *quinquepartita*, 338
 — **retusifolia**, 328

- Ternstroemia revoluta*, 307
 — *roraimae*, 342
 — *rubicunda*, 342
 — *Ruiziana*, 342
 — *Schomburgkiana*, 313
 — *Seemanni*, 471
 — *Seleriana*, 475
 — *serrulata*, 478
 — *siphilitica*, 478
 — *sphaerocarpa*, 475
 — *Standleyana*, 469
 — *Steubelii*, 343
 — *subcaudata*, 312
 — *suborbicularis*, 338
 — *subserrata*, 340
 — *sylvatica*, 473
 — *Tepezapote*, 475
 — *tristyla*, 318
 — *venosa*, 342
 — *verticillata*, 333
Tetrameles nudiflora, 407
Tetrastigma chapaensis, 180
 — *Henryi*, 180
Tetrathalamus montana, 426
Thaspium aureum, 22
 The Arnold Arboretum during the fiscal year ended June 30, 1942, 509
 Theaceae, XI. *Killipiodendron*, Studies in the, 231
 Theaceae, XII. Notes on the South American species of *Ternstroemia*, Studies in the, 298
 Theaceae, XIII. Notes on the Mexican and Central American species of *Ternstroemia*, Studies in the, 464
Thelypteris Dryopteris, 8
 — *fragrans*, 8
 — *Robertiana*, 8
 — *spinulosa*, 8
 — — *dilatata*, 8
 THIMANN, KENNETH V. & ALBERT L. DELISLE. Notes on the rooting of some conifers from cuttings, 103
Thlaspi arvense, 17
Toxocarpus Gagnepainii, 192
 — *Klossii*, 192
 — *ovalifolius*, 192
Tragopogon major, 28
 — *pratensis*, 28
Trifolium hybridum, 20
 — *pratense*, 20
 — *repens*, 20
Triglochin palustre, 9
Trigonostemon asahanensis, 54
Trimenia papuana, 442
Trisetum spicatum molle, 11
Tristania ferruginea, 83
 — *longivalvis*, 84
 — *suaveolens*, 84
Typha latifolia, 9
Uranthera siamensis, 35
Urtica urens, 14
Vaccinium uliginosum, 23
Valeriana Jatamansi, 196
 — — *glabra*, 196
Vatica subglabra, 184
 Vegetative propagation of eastern white pine and other five-needled pines, The, 198
Veronica alpina unalaschcensis, 24
 — *Anagallis-aquatica*, 24
 — *persica*, 24
 — *Tournefortii*, 24
Viburnum edule, 25
 — *erubescens neurophyllum*, 196
 — *sempervirens*, 378
 — — *trichophorum*, 378
 — *Tsangii*, 378
 — — *xanthocarpum*, 380
Vicia americana angustifolia, 20
Viola arvensis, 21
 WALKER, EGBERT H. New and critical Chinese and Indo-Chinese Myrsinaceae, 344
 WHITE, C. T. Some Papuan Myrtaceae, 79
Xanthomyrtus cardiophylla, 242
 — — *parvifolia*, 243
 — *Dielsiana*, 244
 — *exigua*, 246
 — *fasciculata*, 240
 — *flavida*, 242
 — *humilis*, 243
 — *Klossii*, 245
 — — *brevipedunculata*, 246
 — *lanceolata*, 241
 — *longicuspis*, 241
 — — *fruticosa*, 241
 — *papuana*, 244
 — — *parviflora*, 244
 — *rostrata*, 240
 — *Schlechteri*, 240
 — *scolopacina*, 241
Xanthostemon crenulatus, 82
 — *papuanus*, 82
 — *paradoxus*, 83
Xenodendron polyanthum, 247
Youngia cineripappa, 197
Zizia aptera, 22
 — *cordata*, 22